

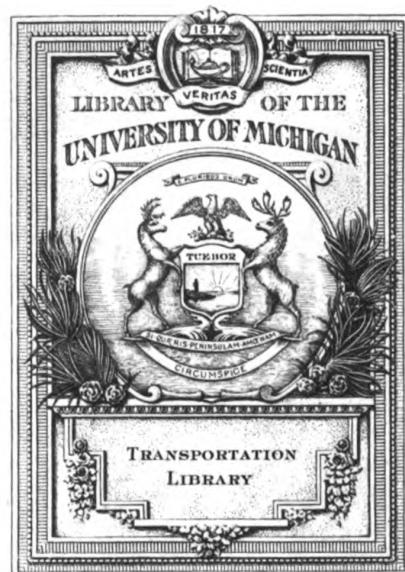
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# **TRANSPORT AIRCRAFT OF THE WORLD**

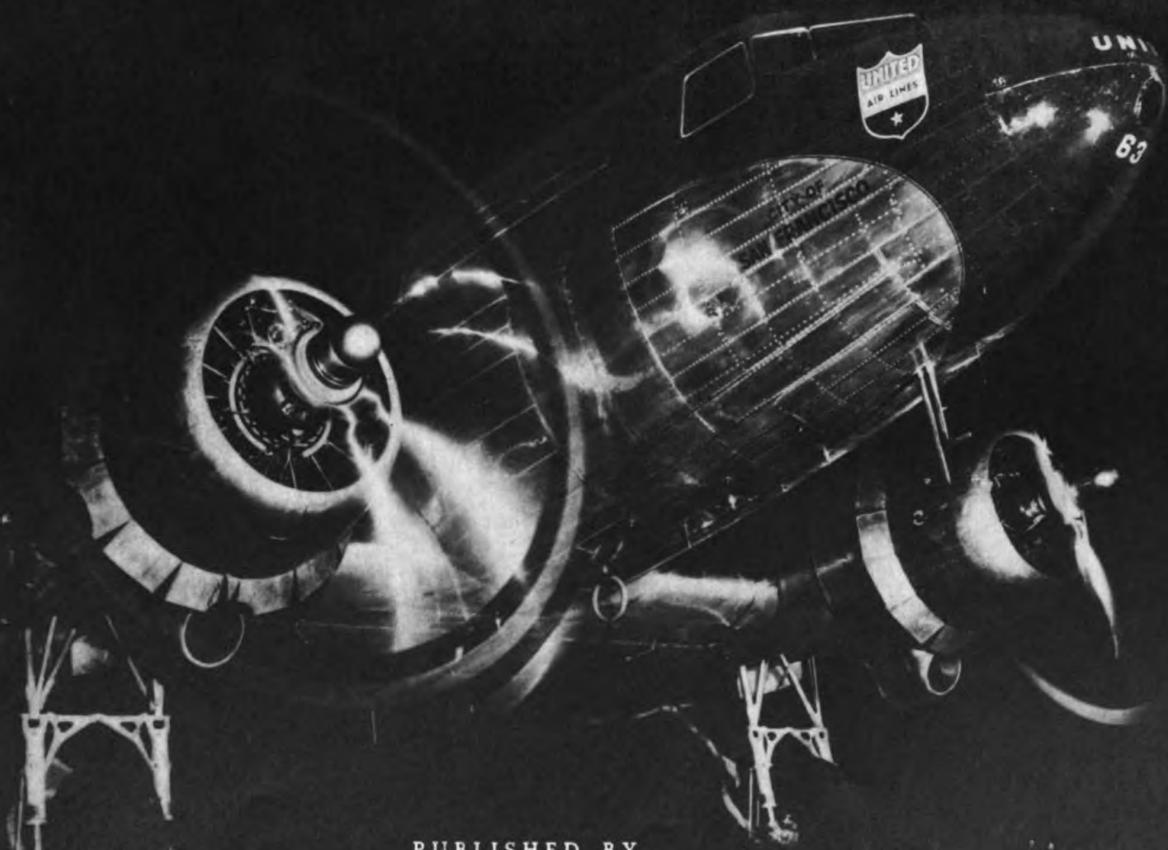


# TRANSPORT AIRCRAFT O F T H E W O R L D

by

## LESTER OTT

AUTHOR OF  
"AIRCRAFT SPOTTER"



PUBLISHED BY

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First Edition

# INTRODUCTION

One of the popular sayings apropos of the Air Age, born in the cauldron of a world-wide war, is that no spot on the earth is more than sixty hours from your doorstep. This volume is designed to show in what type of conveyance you will be able to reach the never-never lands of the world in those sixty hours.

The Air Age has been with us for four decades. It began on a gusty December day in North Carolina in the year 1903 when a pair of bicycle mechanics from Dayton, Ohio, first launched a man-carrying heavier-than-air machine powered with a gasoline engine. The First World War delivered it from its swaddling clothes. The second World War brought it to maturity.

TRANSPORT AIRCRAFT of the WORLD is a guide to the shape of things to come in common carrier aeronautics. The average citizen will voyage far and fast after the war. He will be next door to Paris, a stone's throw from Moscow, overnight from the storied islands of the Pacific.

Commercial air transportation has grown steadily, if slowly, since 1919 when the imaginative Dutch first established scheduled service between the

seat of their empire and London, nerve-center of another empire. The airline passenger first rode in a flimsy linen-and-wire contraption that smelled of burned castor oil and fluttered in the slightest wind. He progressed from that to "huge" tri-engine airplanes such as those produced by the gifted Anthony Fokker and William B. Stout, the latter, the designer of the famed "tin goose" manufactured by Henry Ford seventeen years ago. Those "tin geese" are still flying today, which is to say that an airplane seldom wears out—it just becomes too old to present a decent face to the public.

After Fokker and Ford came the twin-engine Boeing, that first introduced a speed of two and one-half miles a minute to the traveling public; and after the Boeing came Douglas, in two versions, that with the passing years have become standard airline equipment not only in the United States but in many other countries. Four-engine transports followed—notably those by Sikorsky and Boeing that blazed new trails over the oceans to Europe and the Orient.

Now the engineers of the Air Age are looking ahead to the time when citizens

of Keokuk, Sarasota and Walla Walla will plan their vacations in spots half-way around the world. They are sketching the mammoth "flying wings" of the future. In fact, they have already constructed and flown vest-pocket versions of this type of transport. They are ready for that day, when the demands of war fulfilled, they can produce hundreds of flying freight cars to shrink distance and put the material comforts of life in the hands of millions of consumers.

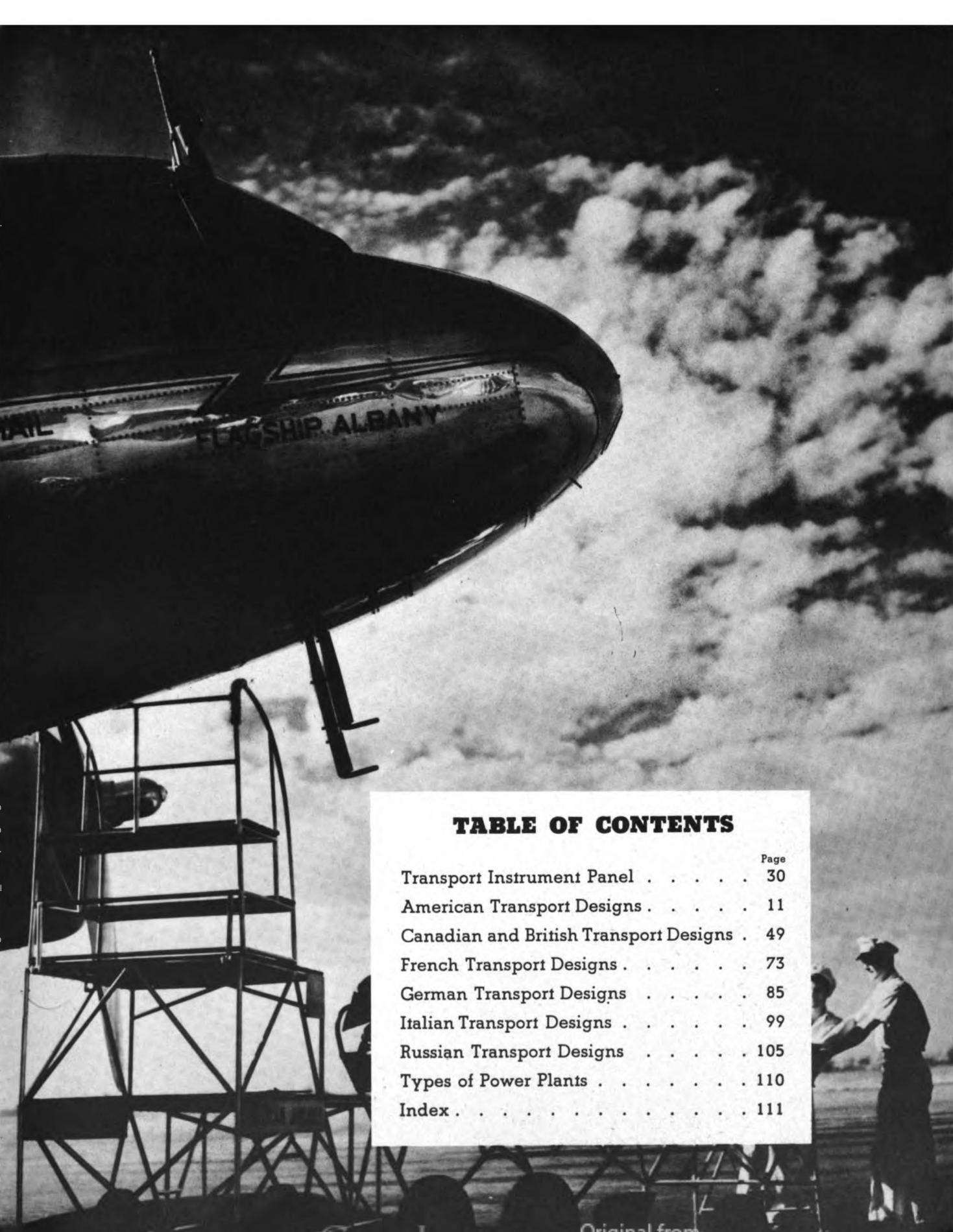
Many new transport designs are in the making. Some of them are already here, testing and waiting for the passenger

market. **TRANSPORT AIRCRAFT of the WORLD** pictures all transport designs that the security provisions of wartime will permit to be published.

This book gives the reader a glimpse of those airplanes that will be built in peacetime. It hints at the competition in the offing for American common carriers. Other countries too will be in the field bidding for the consumer dollar in the field of business and pleasure transportation. American ingenuity will meet that challenge with faster, bigger airliners.

**Dedicated  
To the Designers and Engineers  
of the Aircraft Industry**



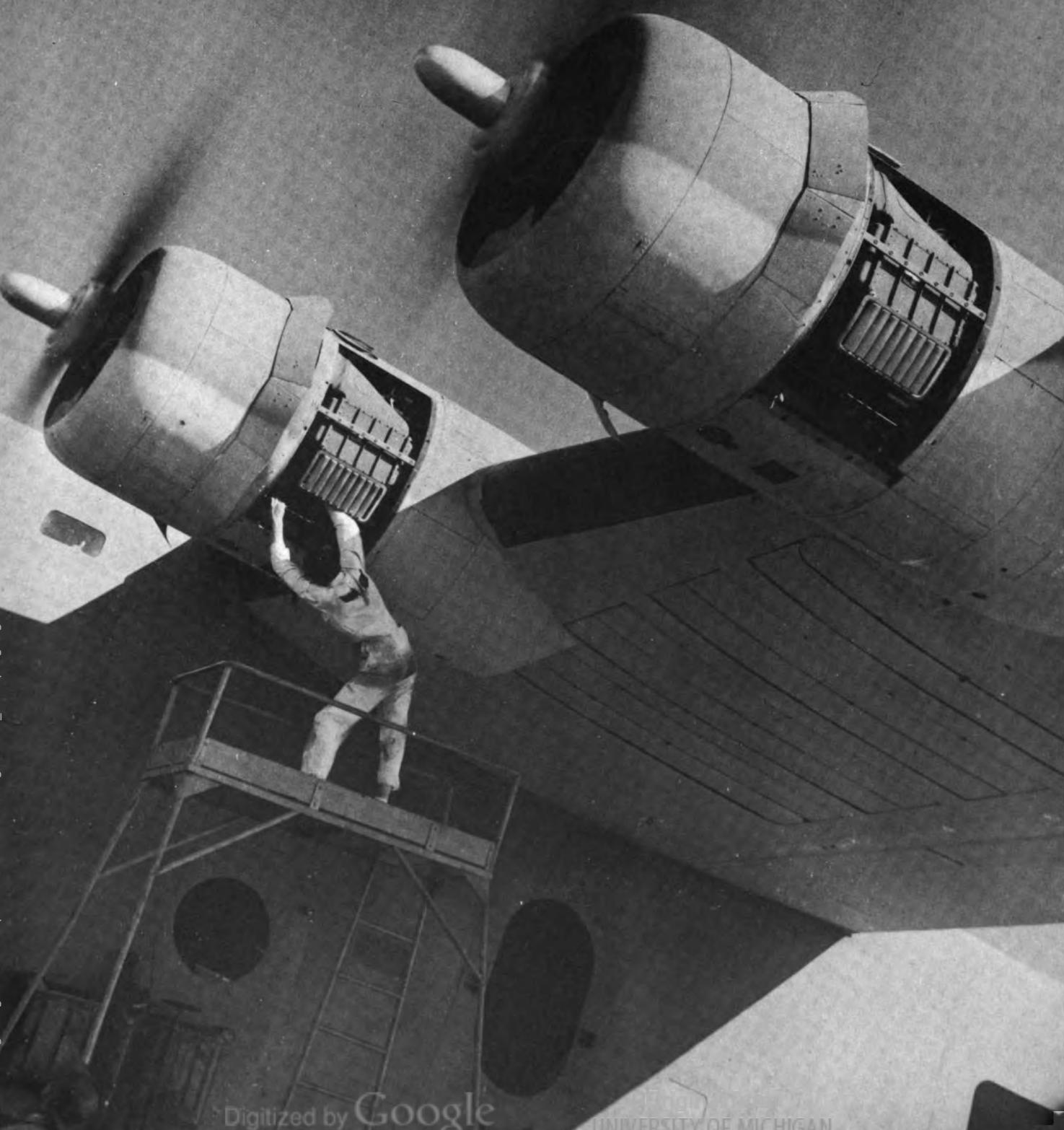


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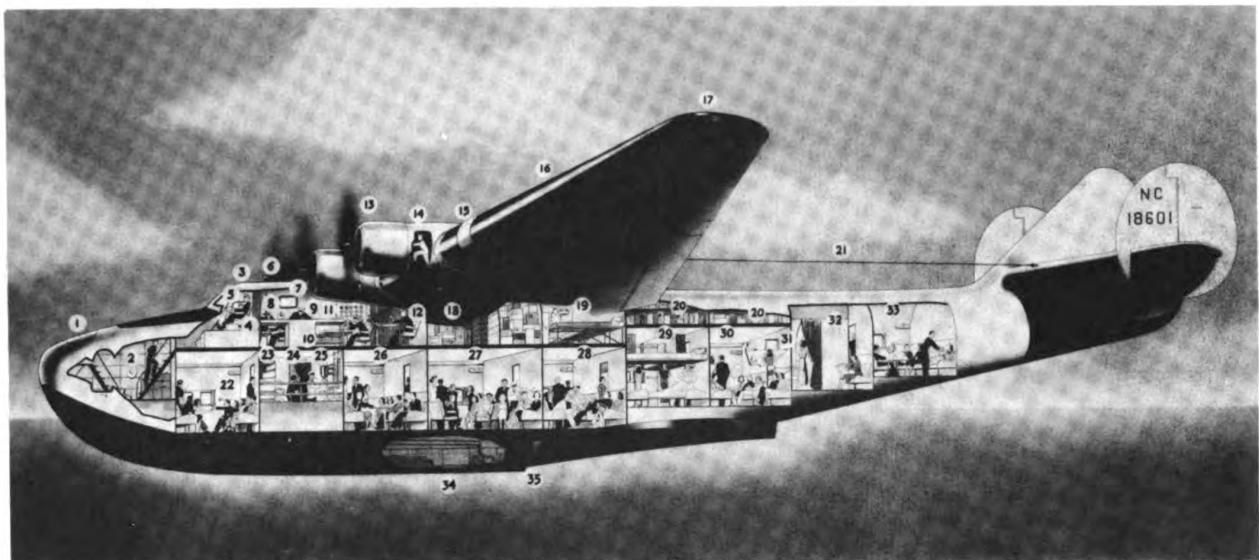


AMERICAN  
TRANSPORT  
DESIGNS





BOEING 314 "CLIPPER"



A CUTAWAY VIEW OF BOEING PAN-AMERICAN CLIPPER

The famous Boeing 314 "Clipper" in service with Pan American Airways World System. They are in use for trans-Pacific and trans-Atlantic routes. The great flying boat is powered by four 1,600-hp. Wright "Cyclone" engines. It is a monoplane of all-metal construction with a boat hull and hydro stabilizers or "sea

wings" for stability on heavy seas. It has a gross weight of 84,000 pounds. The wing span is 152 feet, length 106 feet, height 27 feet, 7 inches, carries a crew of 11 and accommodates 84 passengers. This ship has a speed of about 200 m.p.h. and a range of 4,275 miles, with a service ceiling of approximately 17,000 feet.

(1) Anchor Hatch (2) Seaman's Compartment (3) Bridge (4) First Pilot (5) Second Pilot (6) Radio Direction Finder "Loop" (7) Navigation Compartment (8) Radio Officer's Post (9) Navigator's Post (10) Marine Library (11) Engineering Officer and Aircraft Controls (12) Captain's Office (13) Wright "Cyclone" Engines (14) Mechanic's Wing Station (15) Landing Lights (16) Wing Spread 152 Feet (17) Navigation Lights (18) Main Cargo Hold (19) Crew Quarters (20) Luggage Holds (21) Aerial (22) First Passenger Compartment for 10 Persons (23) Staircase to Bridge (24) Men's Retiring Room (25) Galley in which two stewards can work and food can be prepared for 85 persons (26) Second Passenger Compartment for 10 Persons (27) Dining Lounge for 15 Passengers (28) Third Passenger Compartment for 10 Persons (29) Fourth Passenger Compartment for 10 Persons, illustrating conversion into sleeper (30) Fifth Passenger Compartment for 10 Persons (31) Ladies' Dressing Room (32) Sixth Compartment (33) Private Suite (34) Fuel Pumps for transferring fuel from sea-wings to wing tanks (35) Auxiliary Hold.



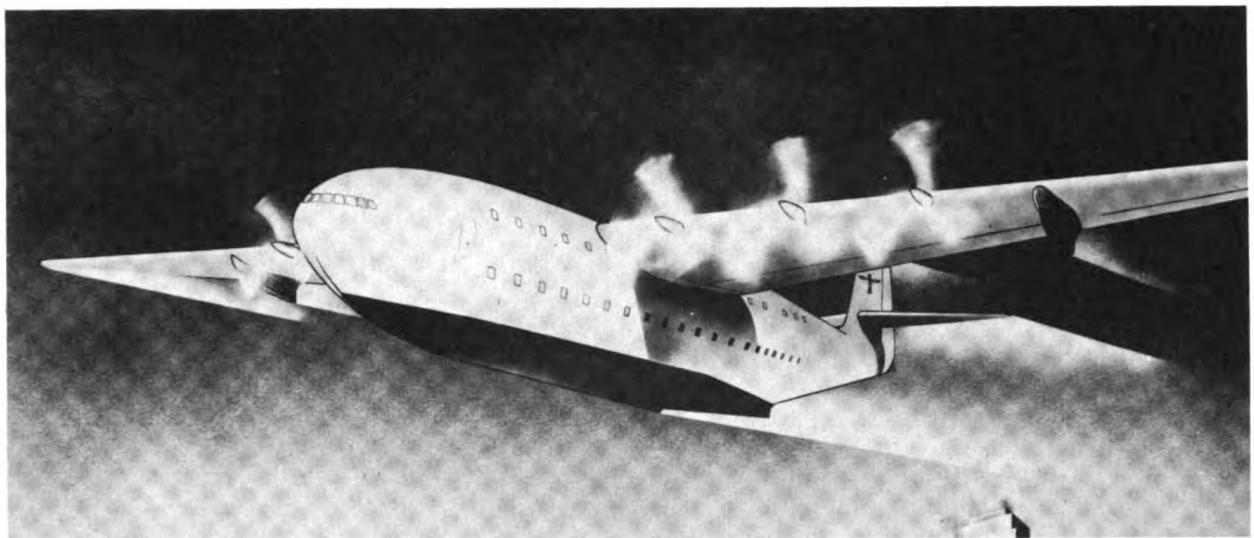
The flight control deck of the great "Clipper." Forward are the first and second pilot, navigator at chart board, radio operator and flight engineer at their posts.



THE BOEING 307-B "STRATOLINER" IN FLIGHT

The Boeing 307-B "Stratoliner," the world's first commercial airliner designed to carry passengers up to 20,000 feet. Cabin super-chargers allow low-altitude pressure. Powered by four 1,100-hp. Wright "Cyclone" engines. The ship has a speed of 250 m.p.h. A low-wing monoplane of all-metal construction. It has a wing span of

107 feet, 3 inches, length 74 feet, 4 inches, height 17 feet, 3 inches, weight 22½ tons, service ceiling 26,200 feet. Carries 33 passengers and a crew of 5. These planes are used on TWA's fast coast to coast schedule, and by Pan American on their South American routes.



DRAWING OF BOEING "SUPER CLIPPER" IN FLIGHT

The six-engine, 100 passenger Boeing "Super Clipper," designed to meet the requirements of Pan American Airways, when they asked for proposals of a ship

which would carry a payload of 25,000 pounds for 5,000 miles at a minimum speed of 200 m.p.h. at sea level, ranging up to 300 m.p.h. at high altitudes.



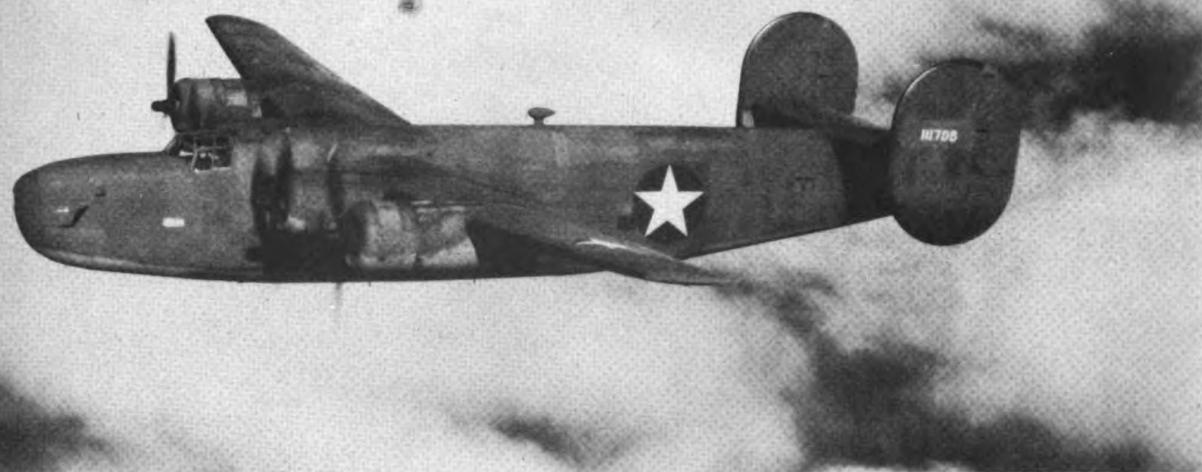
Cutaway view of Boeing proposed 100 Passenger "Clipper"

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LOADING THE C-87 LIBERATOR EXPRESS

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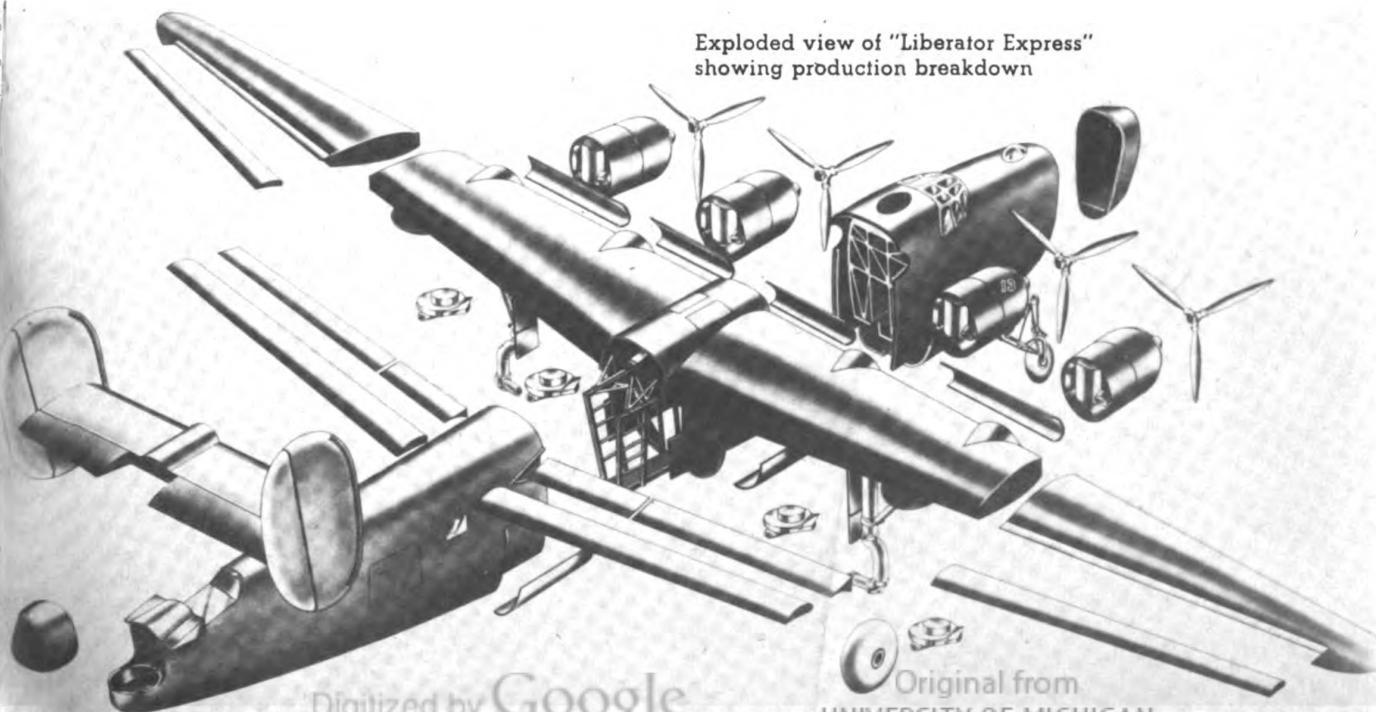


THE C-87 "LIBERATOR EXPRESS" IN FLIGHT

The Consolidated Vultee "Liberator Express" C-87, a four-engine super transport which is a modified version of the B-24 Liberator bomber. This ship carries more passengers and greater cargo loads (over six tons) than any airplane now in mass production. Powered by four Pratt &

Whitney "Twin Wasp" radial air-cooled engines. It has a speed of over 300 miles per hour, and a range of 4,000 miles. Its wing span is 110 feet, overall length 63 feet, and height 19 feet. Approximate gross weight is 40,000 pounds.

Exploded view of "Liberator Express" showing production breakdown

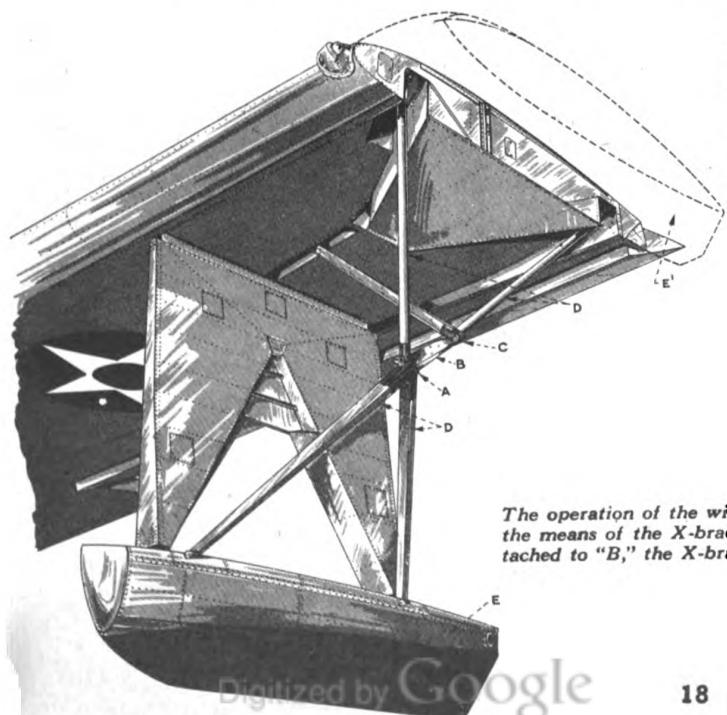




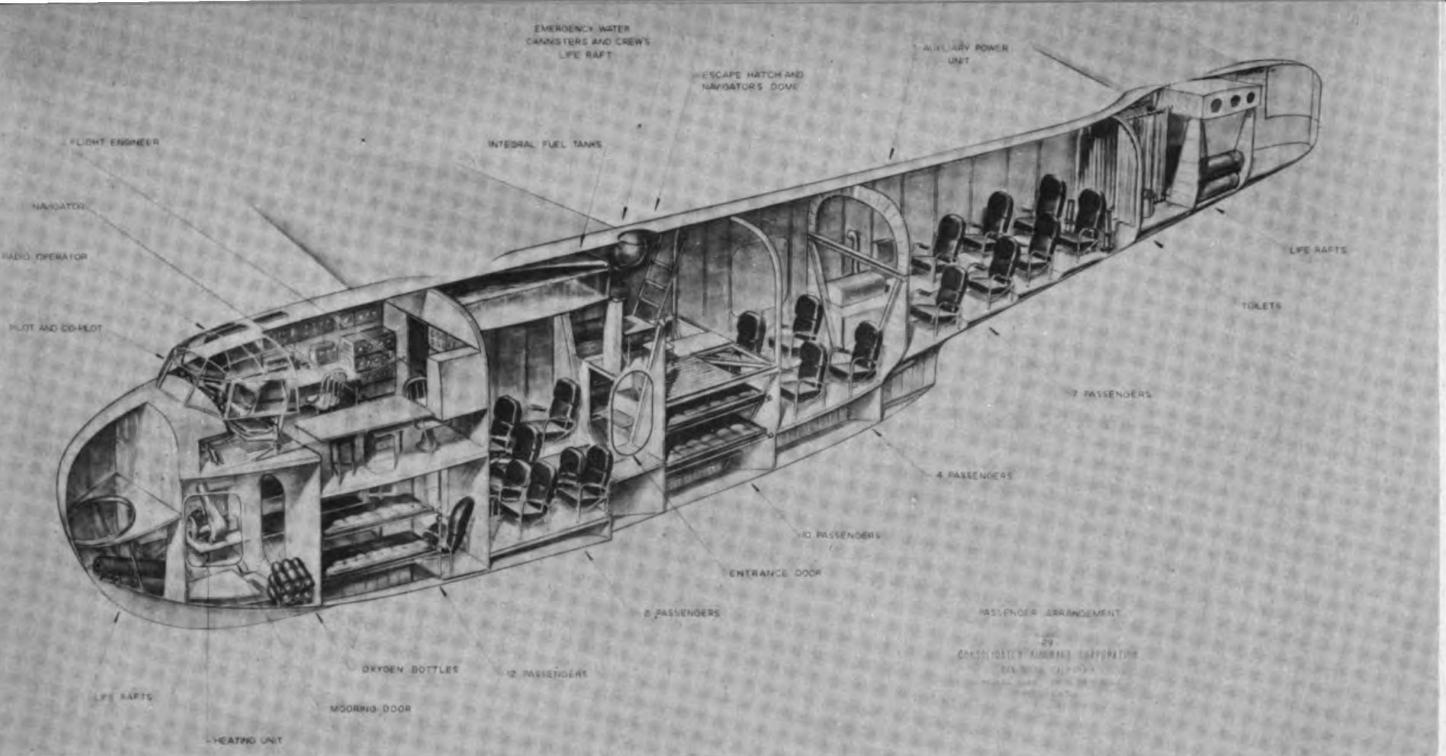
THE "CORONADO" PB2Y-3R FLYING BOAT AT TAKE-OFF

The Consolidated Vultee "Coronado" PB 2Y-3R Navy patrol bomber, which has been used to some extent as a cargo car-

rier. This four-engine flying-boat could be converted so as to carry approximately 60 passengers or a large cargo. This ship weighs 30 tons. It is powered by four Pratt & Whitney "Twin Wasp" engines, with a top speed of about 225 miles per hour, and a range of over 3,500 miles.



*The operation of the wing tip float on the PB2Y-3R Coronado Flying Boat is by the means of the X-bracing "D" hinged at "A." By withdrawing the arm "C" attached to "B," the X-bracing is pulled inward and "E" travels to "E."*

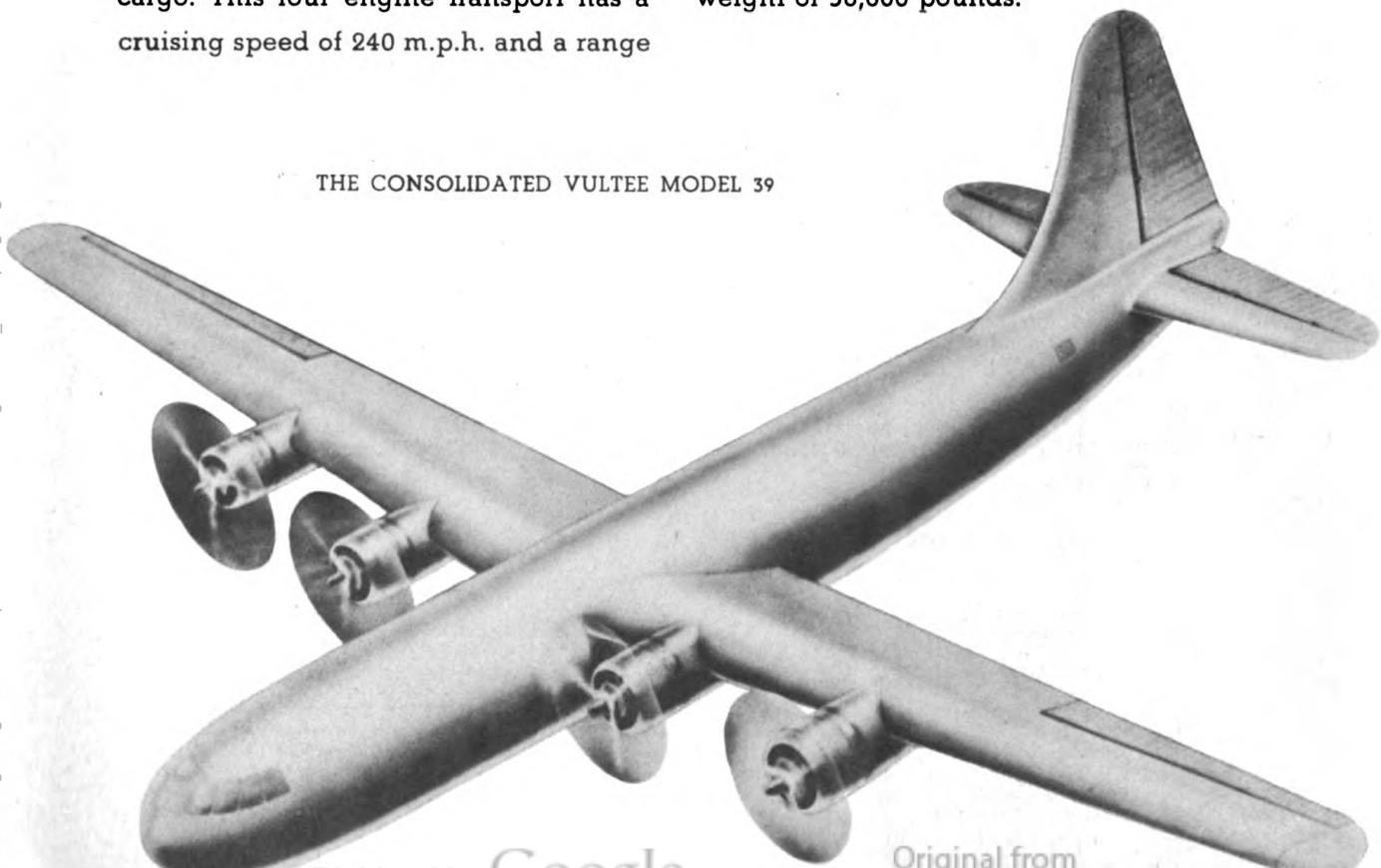


CUTAWAY VIEW OF "CORONADO" PB2Y-3R

The Consolidated Vultee, Model 39 will either seat 48 passengers, accommodate 24 for sleeping or carry 12,000 pounds of cargo. This four engine transport has a cruising speed of 240 m.p.h. and a range

of 2,500 miles fully loaded. The "Model 39" has a wing span of 110 feet and a length of 90 feet. The ship has a gross weight of 56,000 pounds.

THE CONSOLIDATED VULTEE MODEL 39





THE CURTISS "COMMANDO" C-46 MILITARY COUNTERPART OF THE CIVIL VERSION CW-20-C

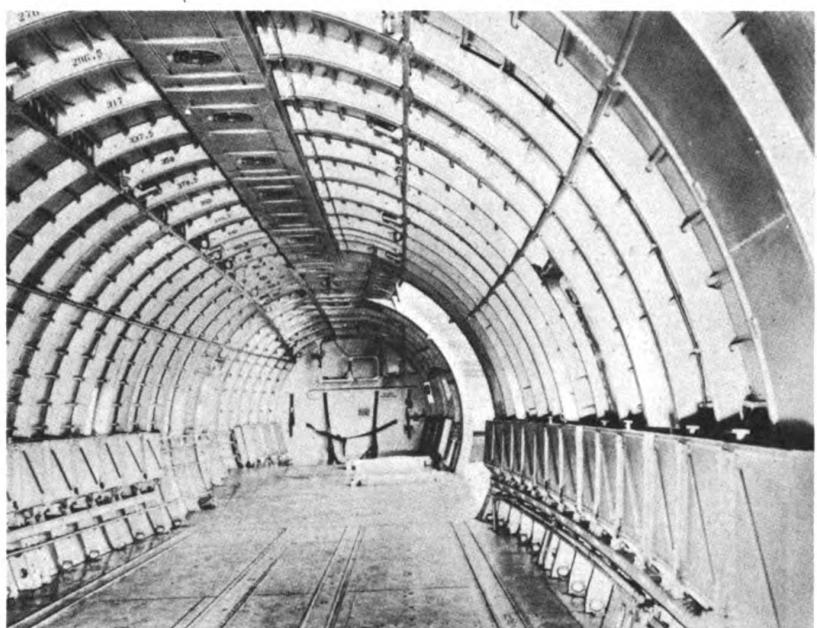
Largest twin-engine airplane in the world, the Curtiss-Wright CW-20-C, known as the "Commando," is a low mid-wing all metal monoplane. Powered by two 2,000 hp. Pratt & Whitney R-2800 engines, it has a top speed of 254 m.p.h. and a cruising speed of 225 m.p.h. at 15,000 feet, with an approximate range of 2,000 miles.

The fuselage is of conventional construction, except that the cross section is in the shape of two intersecting circles. These are divided by the floor of the car-

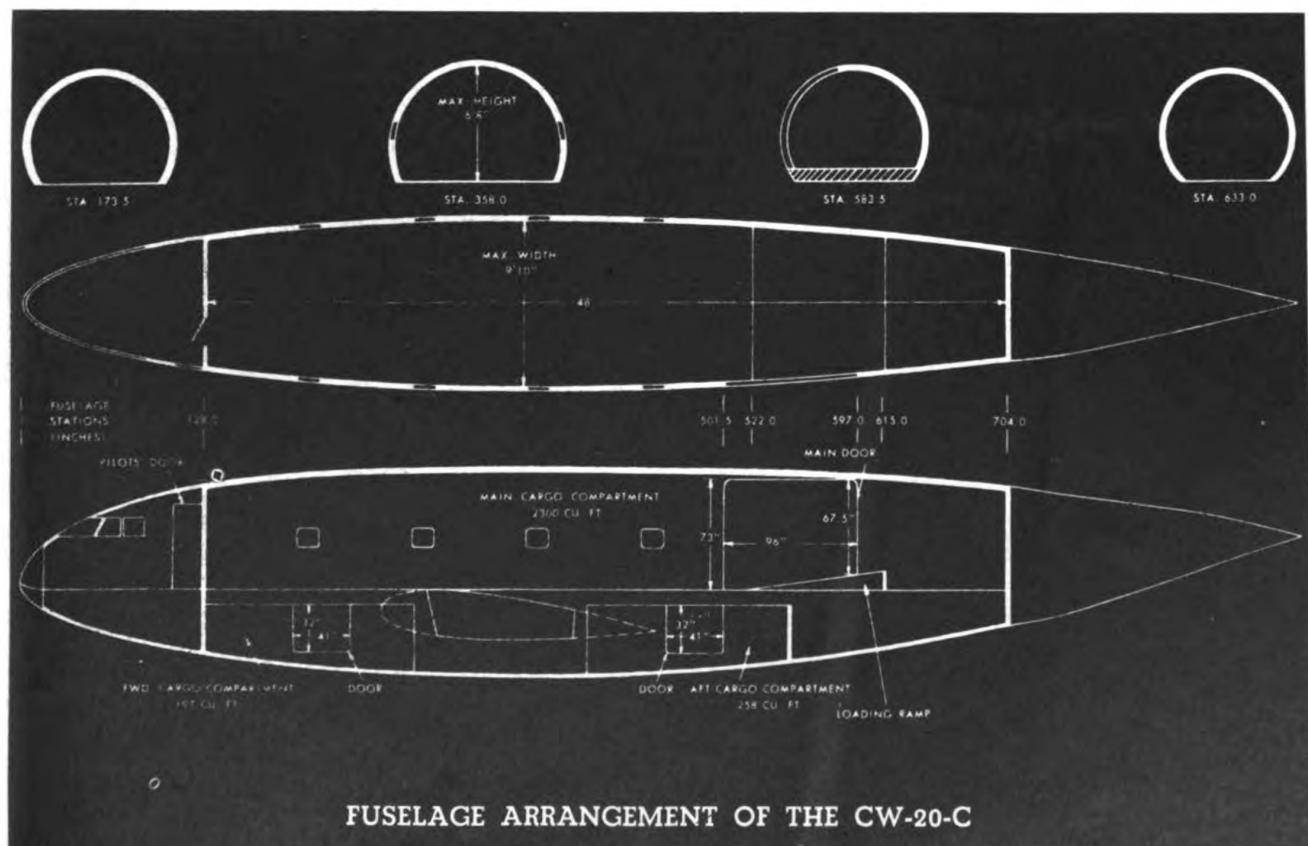
go compartment, providing two smaller compartments below, suitable for smaller packages or special items.

The wing span is 108 feet, length 76 feet, 4 inches, and height 21 feet, 9 inches. It has a cargo capacity of 2,755 cubic feet, and a payload capacity of 18,000 pounds. Gross weight 45,000 pounds, overload gross weight 50,000 pounds.

The passenger version of this transport accommodates 36, with a crew of three.

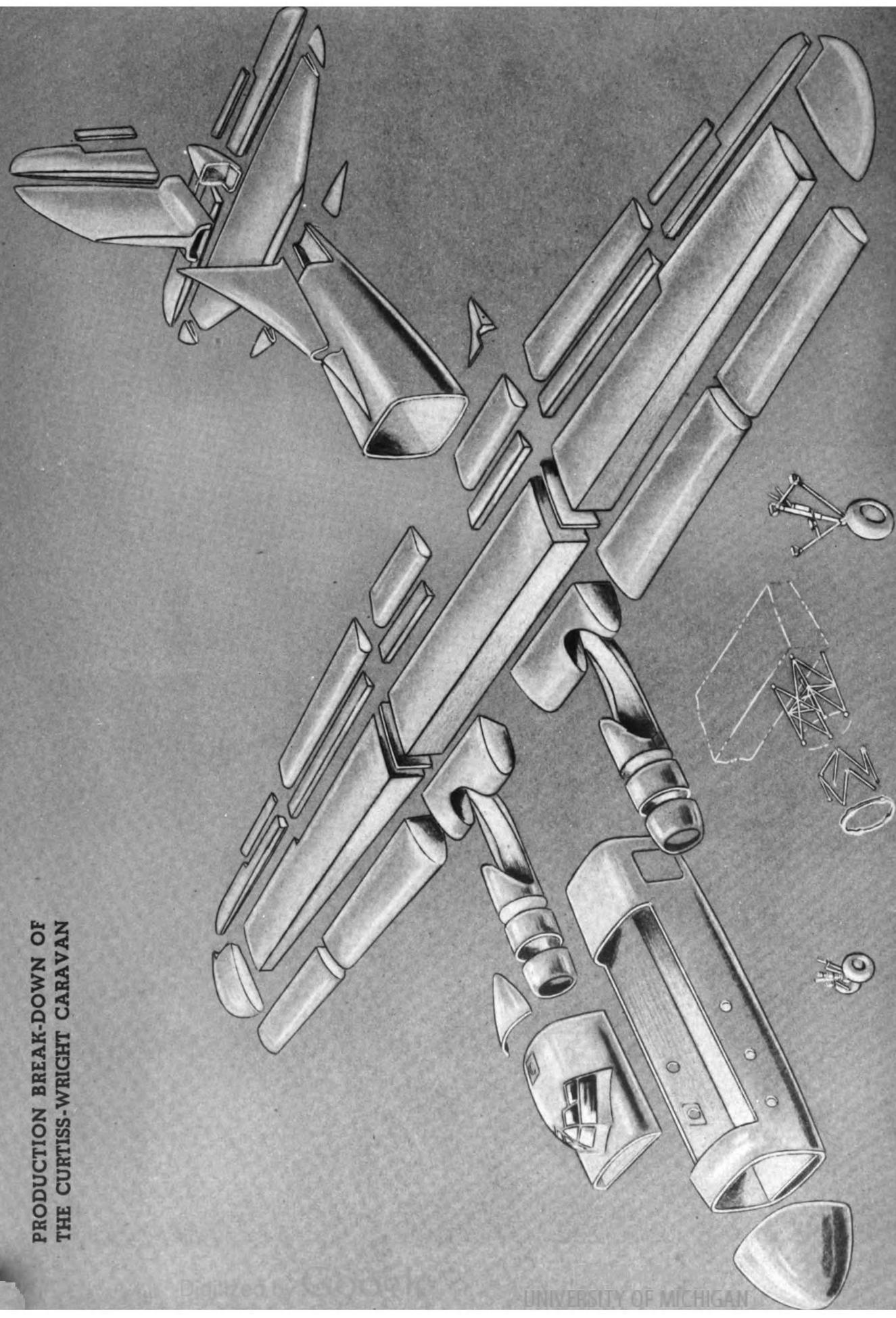


Interior of the Curtiss CW-20-C showing construction of fuselage.



FUSELAGE ARRANGEMENT OF THE CW-20-C

PRODUCTION BREAK-DOWN OF  
THE CURTISS-WRIGHT CARAVAN





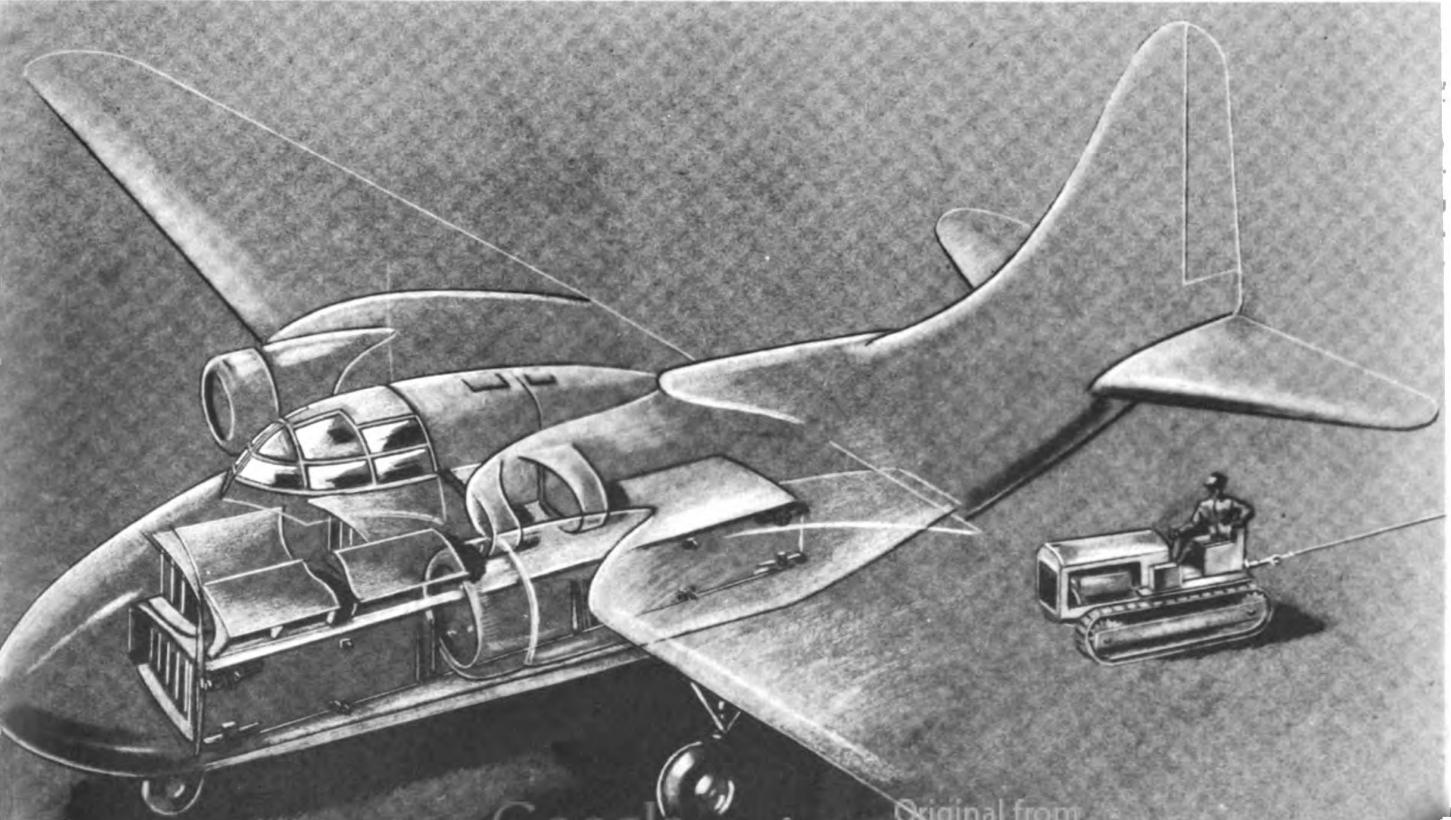
THE CURTISS C-76 "CARAVAN" COMING IN FOR A LANDING

America's first transport plane of all wood construction, is the giant Curtiss C-76 "Caravan." It is powered by two 1,200-hp. engines. It has a wing span of 108 feet.

One of its many features is the cargo door which is only 36 inches off the ground for easy freight loading.

The control compartment for the "Caravan" crew is situated above the forward section of the fuselage.

Cargo can be easily accommodated and quickly discharged from roomy interior of fuselage.



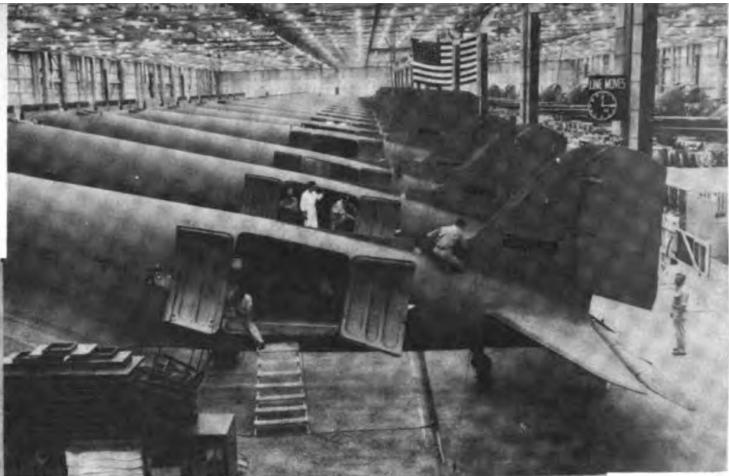
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THE DOUGLAS DC-3

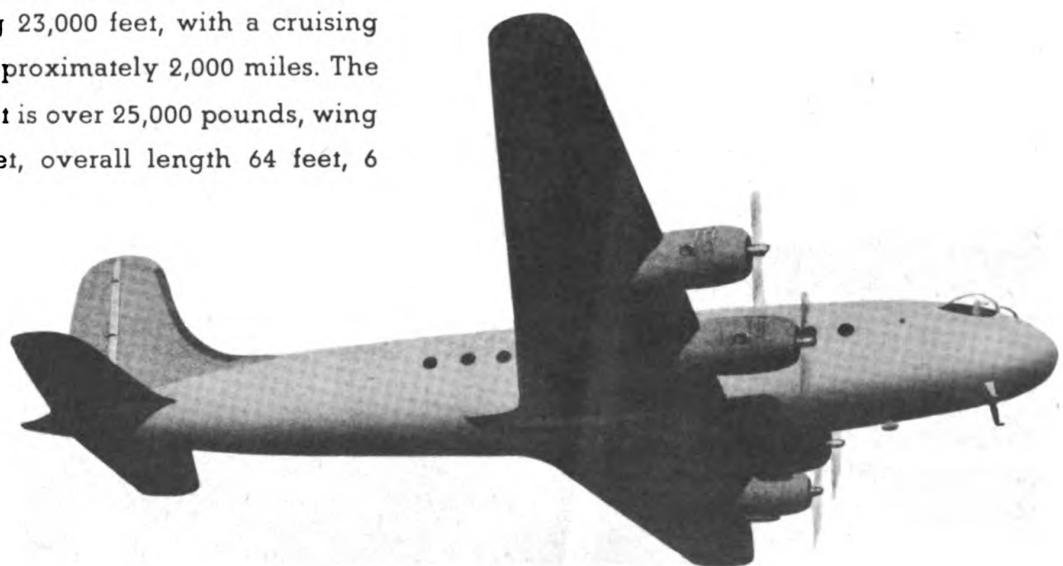
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The C-47 "Skytrains" Army Version of the DC-3 on the assembly line. The big "clock," which tells when assembly line moves next, can be seen at the right.

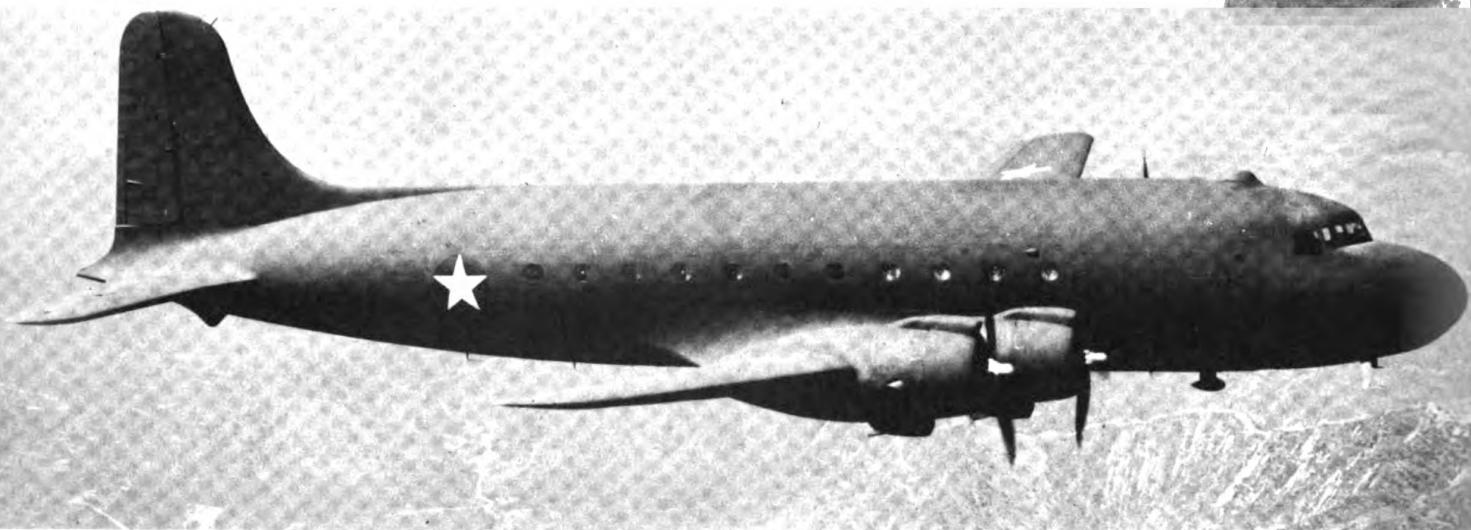


The Douglas DC-3, one of the nation's best known airliners, carries 21 passengers and a crew of three. Powered by two Wright "Cyclone" engines of 1,200 hp. each. It has a top speed of 225 m.p.h. Service ceiling 23,000 feet, with a cruising speed of approximately 2,000 miles. The gross weight is over 25,000 pounds, wing span 95 feet, overall length 64 feet, 6

inches. These ships known as the C-47 and C-53, under the Army Transport Command, are affectionately referred to as the "work horses" of this war.

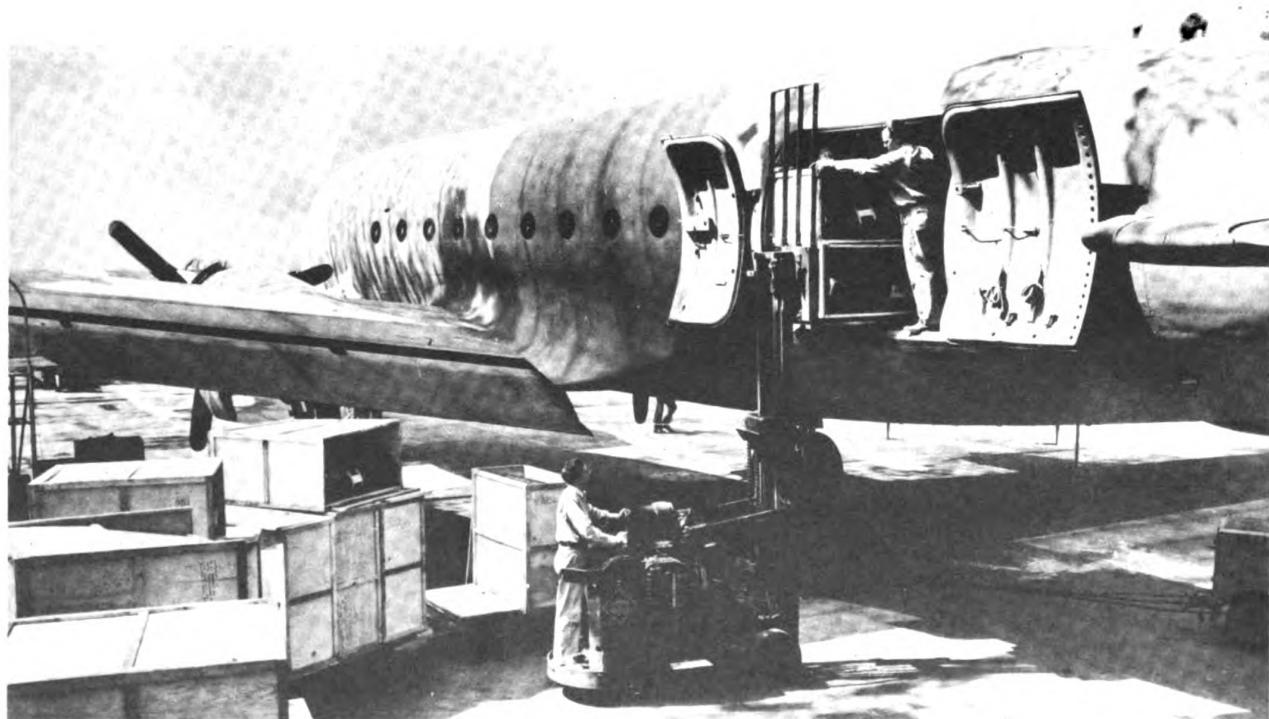


Sketch of the Douglas DC-7, a four engine transport designed to accommodate 86 passengers and 20,000 pounds of cargo or 150 passengers. The DC-7 has a cruising speed of about 230 m.p.h. and a range of 4,000 miles.



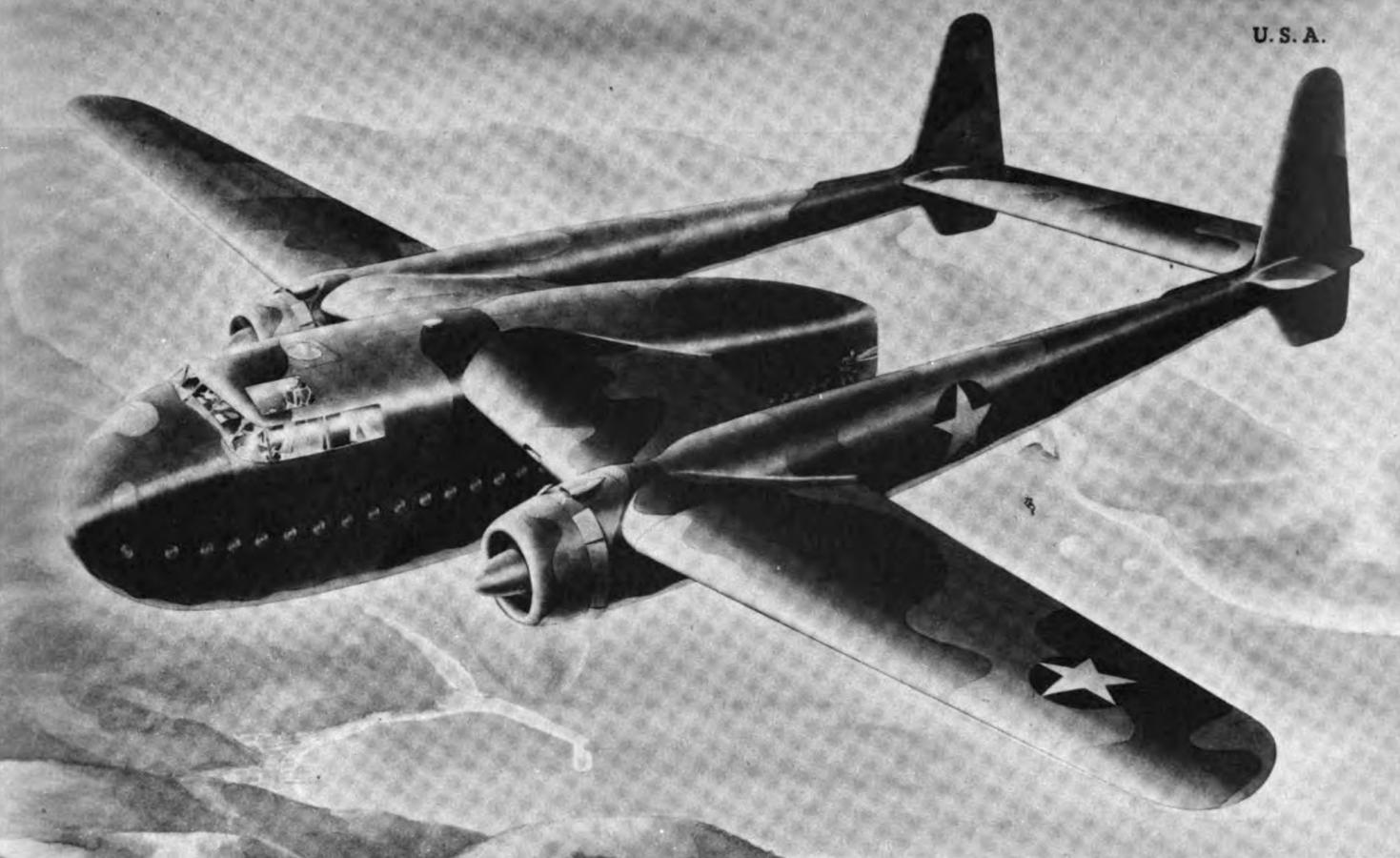
The Douglas DC-4 accommodates 40-42 passengers. A modification of this ship, at present known as the C-54, is used as a troop and cargo carrying transport by the Army and Navy. This is the largest plane of this type in quantity production. Its cargo capacity is equal to that of a standard railroad boxcar. This ship is powered by four Pratt & Whitney 1,350-

hp. engines with a speed of about 300 m.p.h. and a cruising range of over 2,500 miles. The wing span is 117 feet, 6 inches, length 93 feet, 10 inches, and height 27 feet, 9 inches. Normal payload is 19,000 pounds. Planes of this type will probably be the first to be converted for civilian use after the war.



Loading the Douglas C-54 "Skymaster"

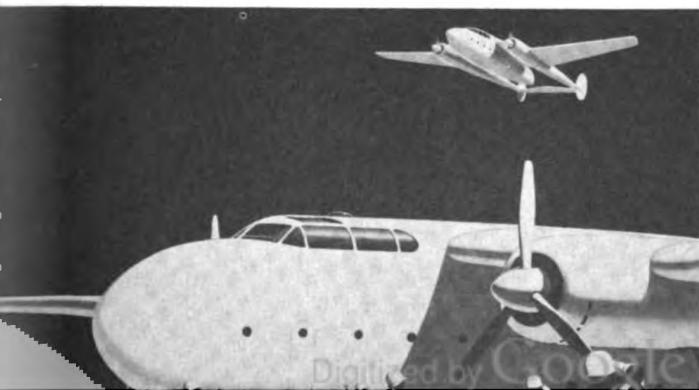
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ARTIST'S CONCEPTION OF THE FAIRCHILD XC-82

The Fairchild XC-82, one of the newest twin-engine cargo planes designed for the Army will be easily adaptable for commercial air service. Proposed cruising range is over 3,500 miles. The design of this ship allows easy handling of cargo through large doors at the rear of the

fuselage. Unlike present plastic training planes, manufactured by the Fairchild organization, the XC-82 is built entirely of metal. As this ship was developed for the Army Transport Command, further performance data and dimensions are restricted.



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PRODUCTION BREAKDOWN

Lockheed "Constellation"

Cargo Version

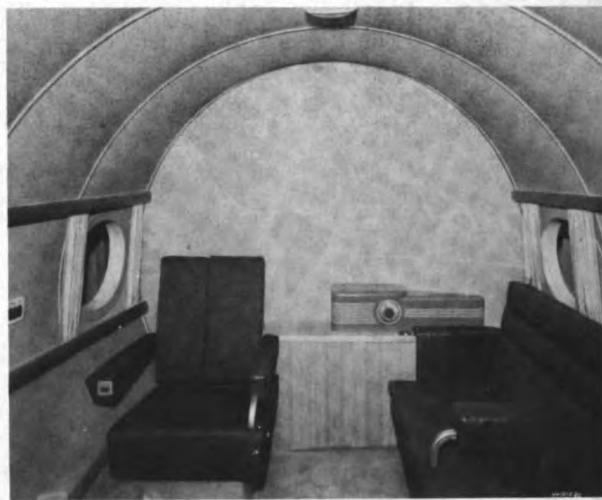


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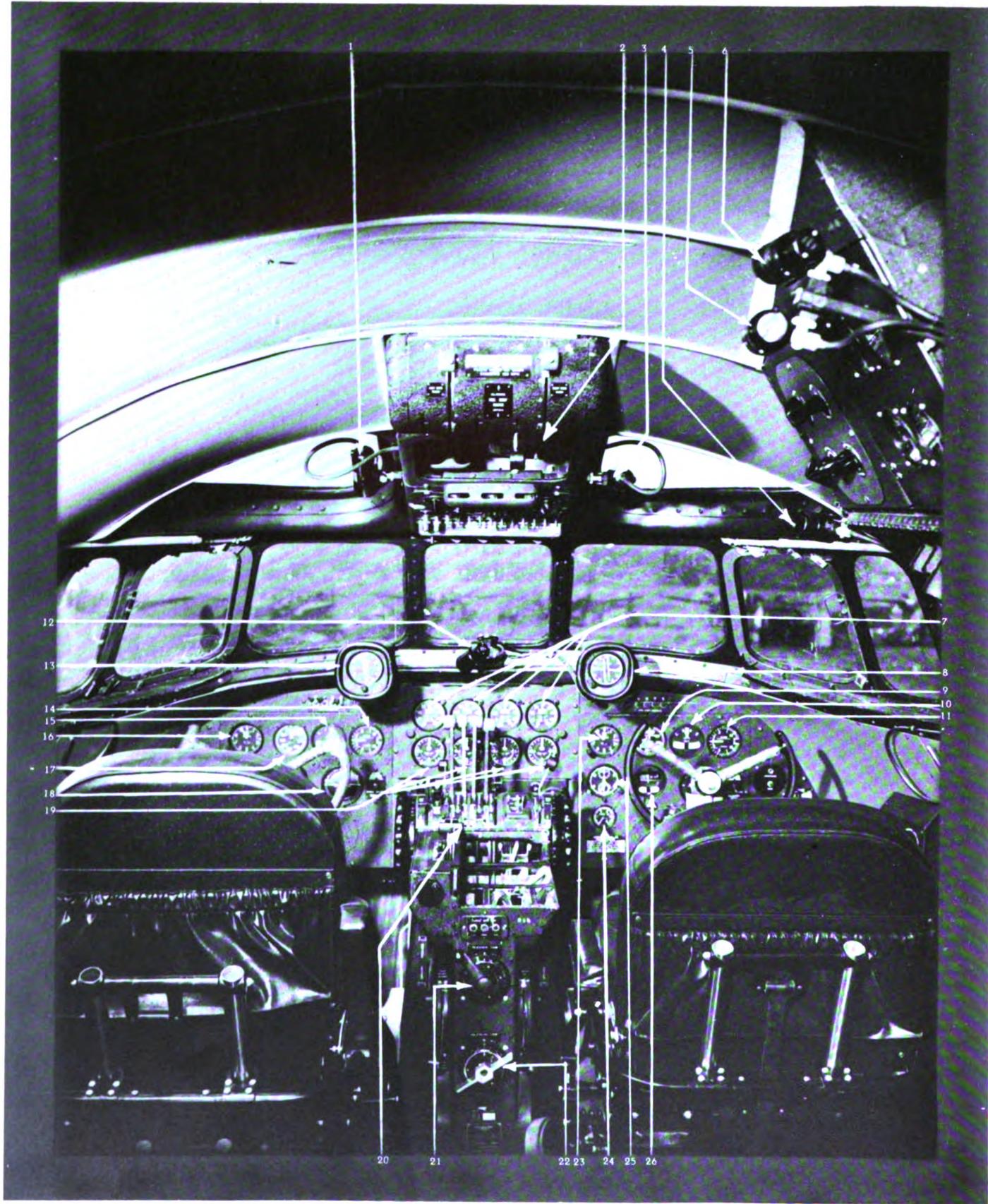
THE GIANT LOCKHEED CONSTELLATION IN FLIGHT

The Lockheed "Constellation" C-69, designed originally for TWA. It can carry 55 passengers and a crew of nine. It is the largest and fastest of the long-range transports. Powered by four 18 cylinder 2,200-hp. Wright "Cyclone" engines, with a speed of about 300 m.p.h. Pressurized cabin maintains an air density of 8,000 feet, while at altitudes of 20,000 to 35,000 feet "above the weather." A low-wing monoplane with a wing span of 123 feet. The overall length is 94 feet, 11 inches, and its height is 23 feet, 7 $\frac{7}{8}$  inches. It is fitted with tricycle paired landing gears.



Proposed compartment for the civil version of the Constellation is shown in this mock-up.





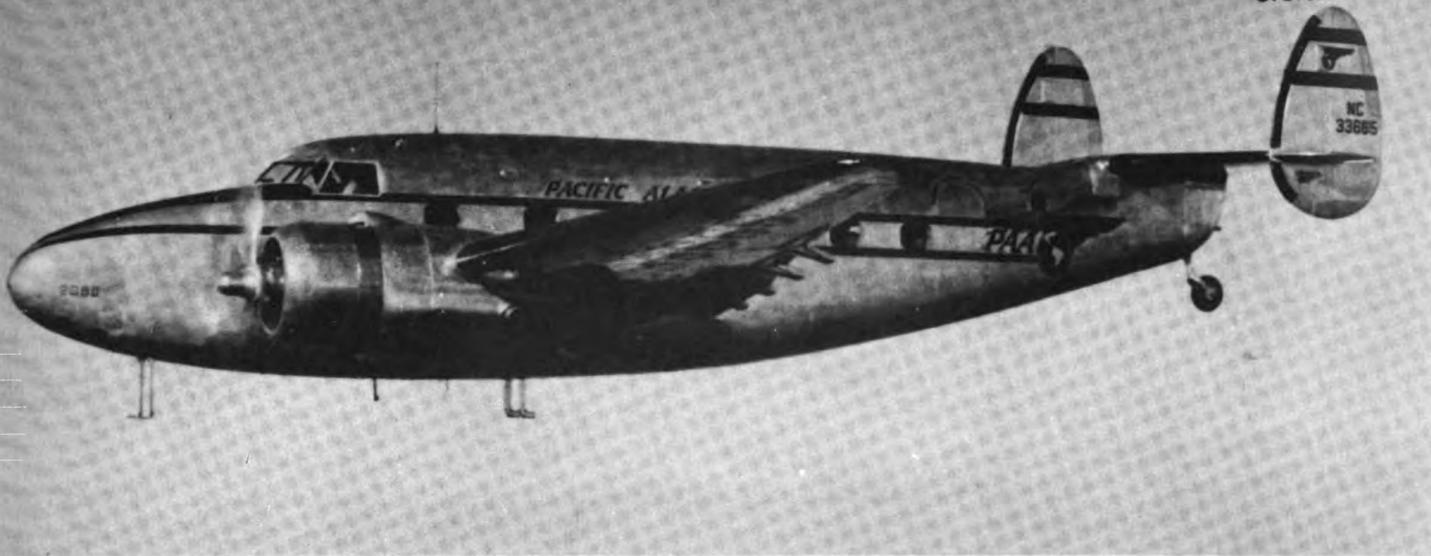
### PILOT'S COCKPIT OF THE CONSTELLATION

(1) Spotlight (2) Engine controls and electric panel (3, 4, 5, 6) Spotlights (7) Manifold pressure gauges (8) Remote compass indicator (9) Airspeed indicator (10) Turn and bank indicator (11) Rate of climb indicator (12) Spotlight (13) Remote compass indicator (14) Climb indicator (15) Turn and bank indicator (16) Altimeter (17) Airspeed indicator (18) Gyro horizon (19) RPM tachometer (20) Controls for engines (21) Rudder Tab control (22) Aileron Tab control (23) Altimeter (24) Oil pressure gauge (25) Elapsed time tachometer (26) Directional gyro.

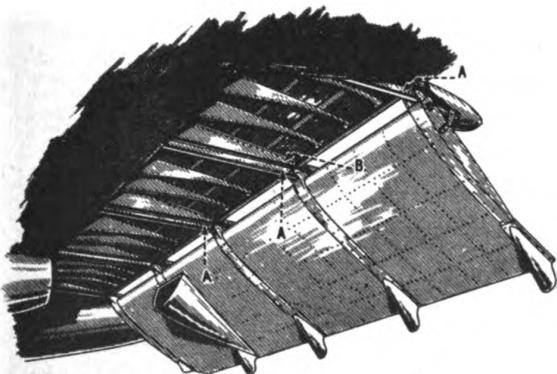
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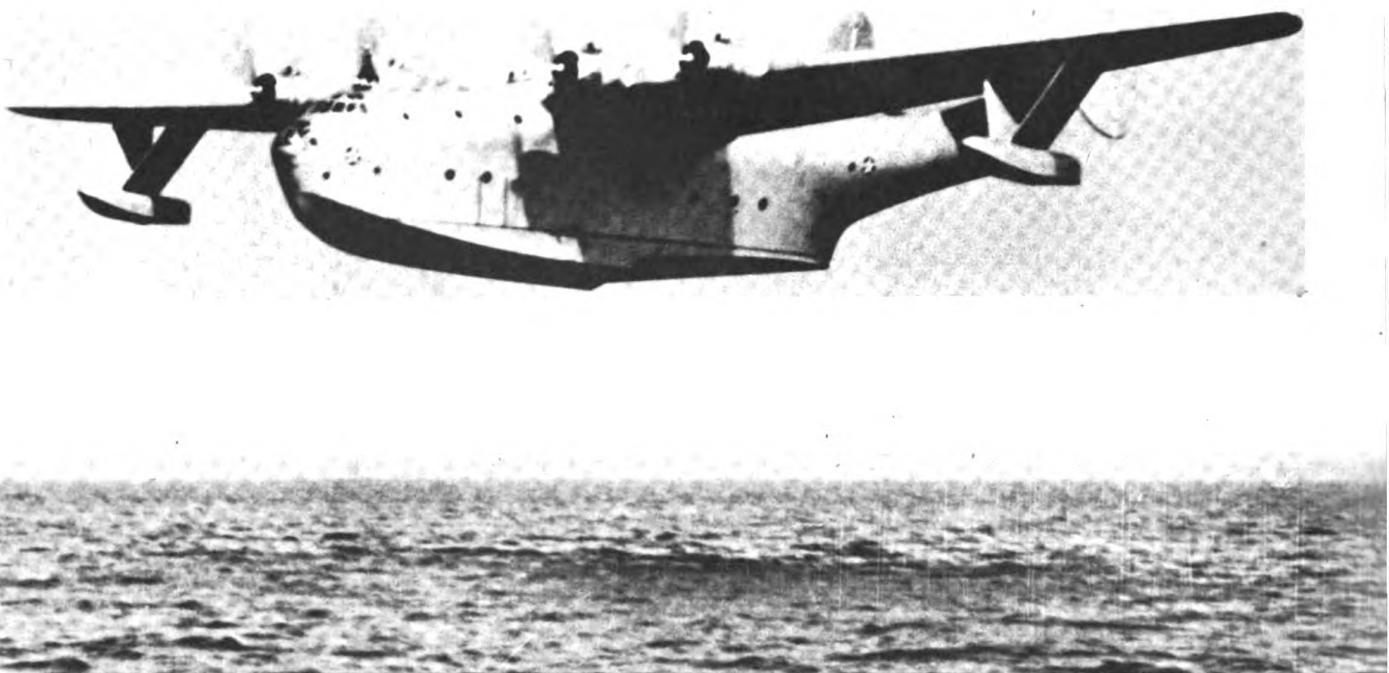


LOCKHEED 18 "LODESTAR"



The Lockheed 18 "Lodestar," famous transport used by leading airlines throughout the world. Powered by either two 1,200-hp. Pratt & Whitney or Wright "Cyclone" engines. It has a top speed of 265 m.p.h. and a cruising range of approximately 2,000 miles. Gross weight 18,500 pounds. A low-wing monoplane with Fowler flaps. Wing span 65 feet, 6 inches, length 49 feet, 9 inches, height 11 feet, 10 inches.

*The Fowler Flaps used on the "Lodestar" enables the transport to land at approximately 65 m.p.h. The flaps consist of miniature auxiliary airfoils located on the under side of the wing near the trailing edge. The flaps travel along tracks "A" and are actuated by flexible cables "B." Tracks are inclined downward at the trailing edge and when flaps are at an extended position, they are at the correct angle. The cables are driven by hydraulically operated push-pull controls operated by the pilot.*



THE MARTIN "MARS" IN FLIGHT

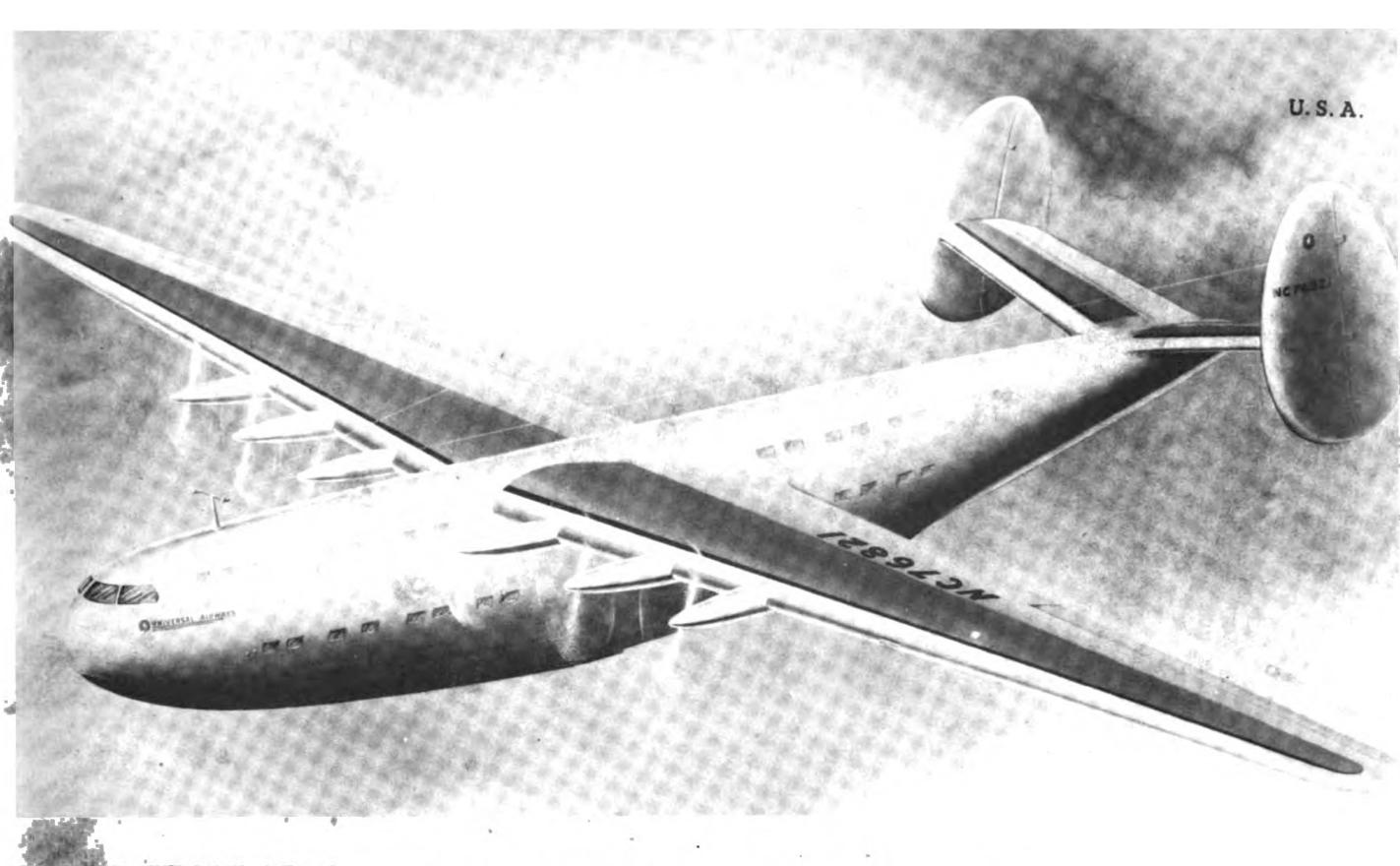
The Martin "Mars," world's largest flying boat in service, set a world record by flying 4,375 miles over the Atlantic to Natal with 13,000 pounds of mail. The Mars set another record by flying 35,000 pounds or 17½ tons of cargo, the heaviest single air shipment ever made. Other records established by this great flying boat were: the heaviest load ever lifted

by an airplane 148,500 pounds gross take-off weight, and the longest non-stop cargo flight. Powered by four Wright "Duplex Cyclone" engines of more than 2,000 hp. Ship's weight is 70 tons. The Mars is a high wing monoplane with wing tip floats and has a span of 200 feet. The two-step boat hull is 117 feet, 3 inches in length.

The Martin Model 170-23, combination passenger and cargo transport, is a proposed commercial version of the "Mars."



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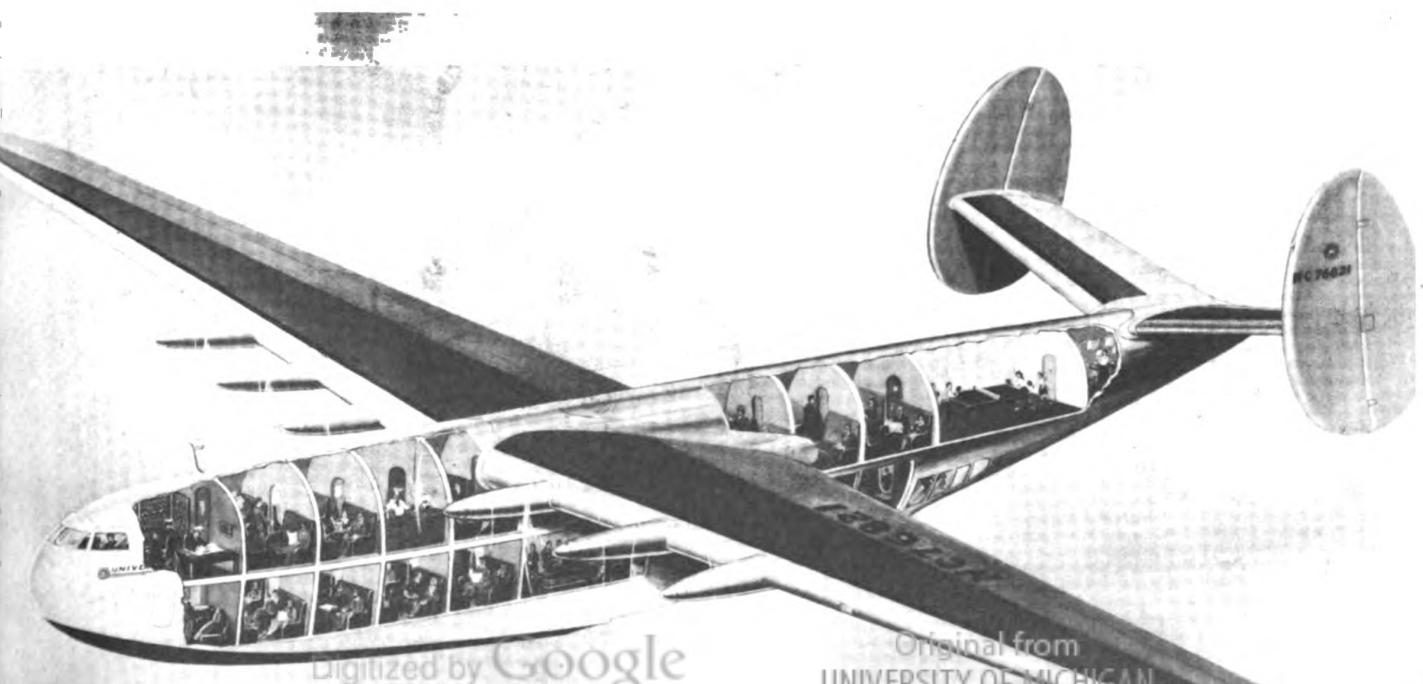


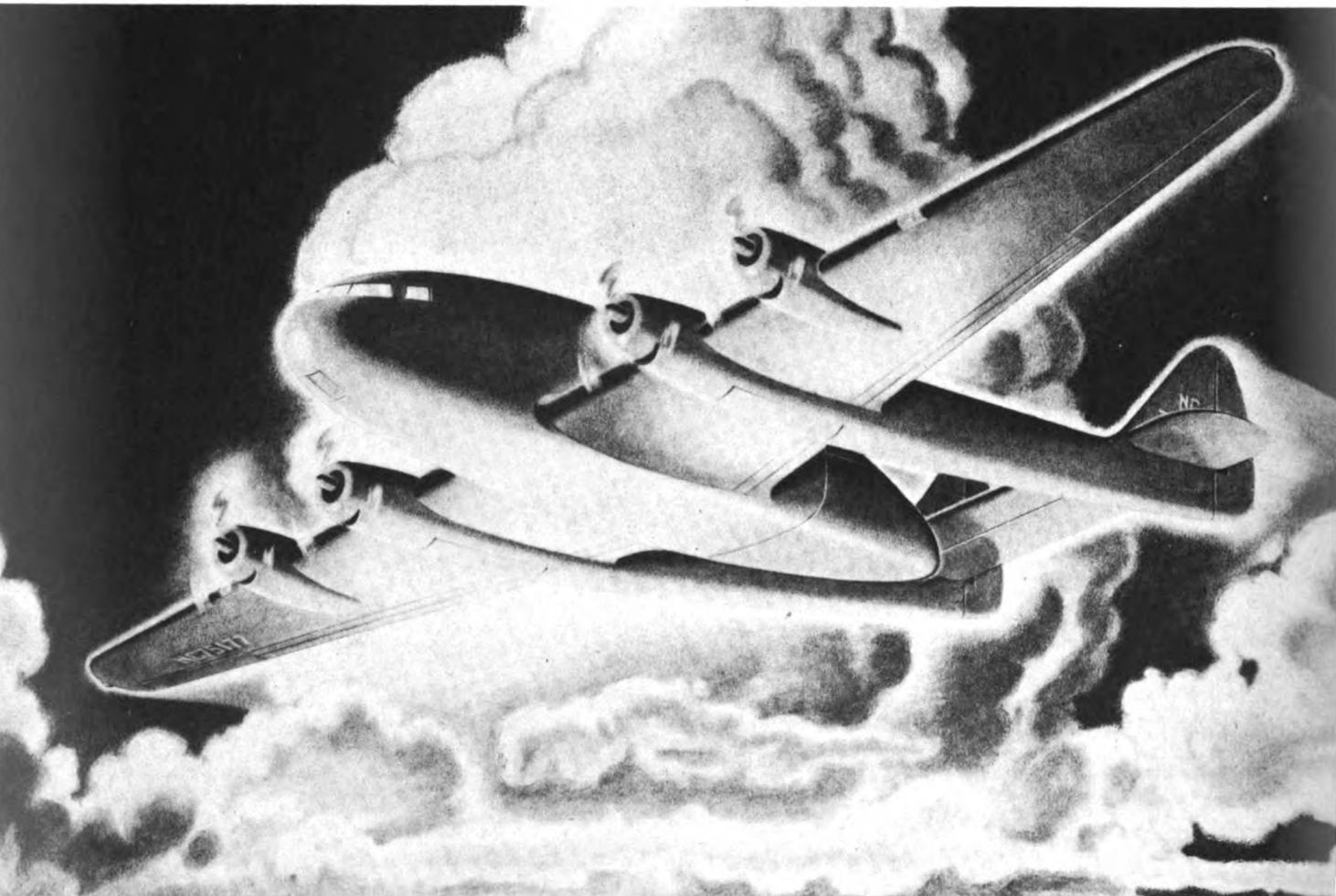
DESIGN FOR THE PROPOSED GLENN L. MARTIN "SKY GIANT"

Two views of the experimental Martin, six-engine luxury airliner. This giant of the skies will weigh 125 tons, and is designed to carry 100 passengers, 8,000 pounds of baggage, and 25,000 pounds

of mail and express cargo from New York to London in 13 hours.

Martin also has plans for embodying even more spectacular development in a larger ship of 250 tons.





SKETCH OF THE GLENN L. MARTIN VAN ZELM CARGO AIRPLANE

The Glenn L. Martin van Zelm cargo airplane designed specifically for handling of aerial freight with provisions for unloading and loading equipment incorporated such as ramps and winches for bringing aboard and stowing heavy

freight for rapid handling. The two versions of the Willem D. van Zelm cargo airplane are low-wing monoplanes with two and four engines (four engine ship pictured) with a tricycle landing gear. Tail surfaces are independent of fuselage

and attached to booms running out from wings. The cargo compartment is in the fuselage, the rear end lifts hydraulically. The same hydraulic mechanism extends a collapsible loading ramp which can be made to run to the ground or to the back

platform of a truck. The two engine version has a gross weight of 60,000 pounds and the four engine version has a gross weight of 86,000 pounds, with a useful load of 36,870 pounds, of which 27,000 pounds would be cargo.

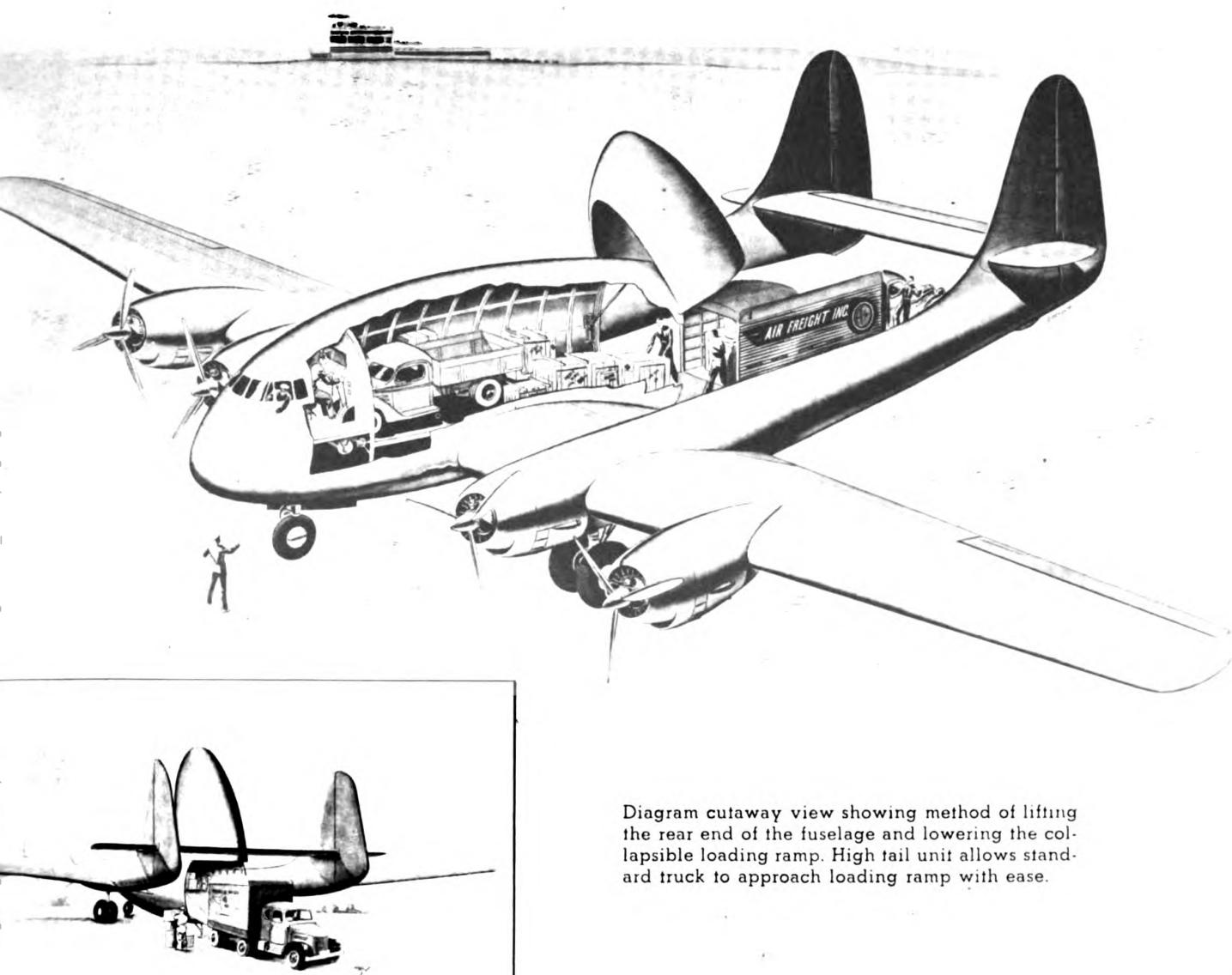
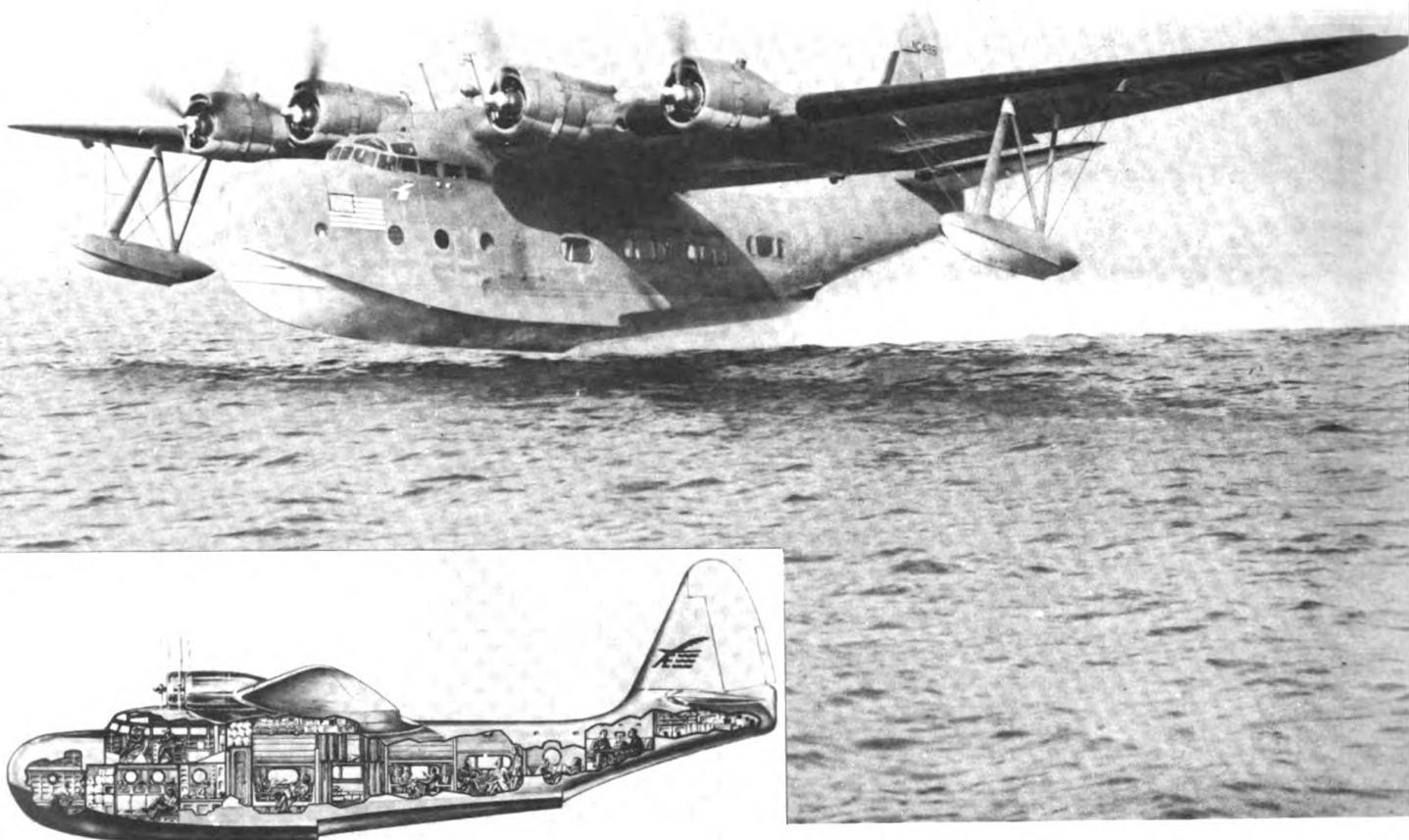
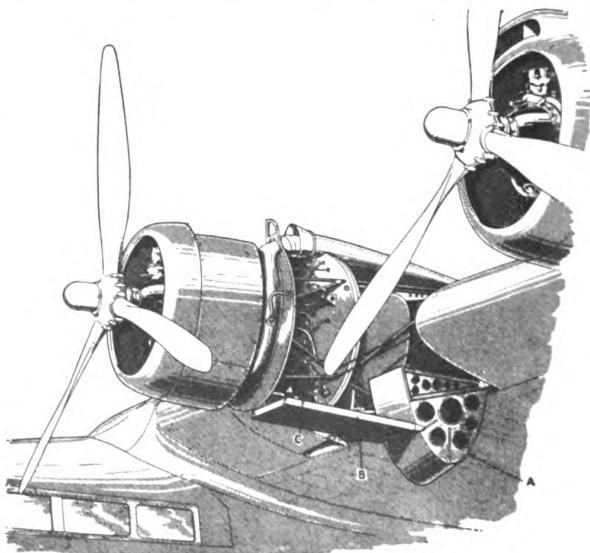


Diagram cutaway view showing method of lifting the rear end of the fuselage and lowering the collapsible loading ramp. High tail unit allows standard truck to approach loading ramp with ease.

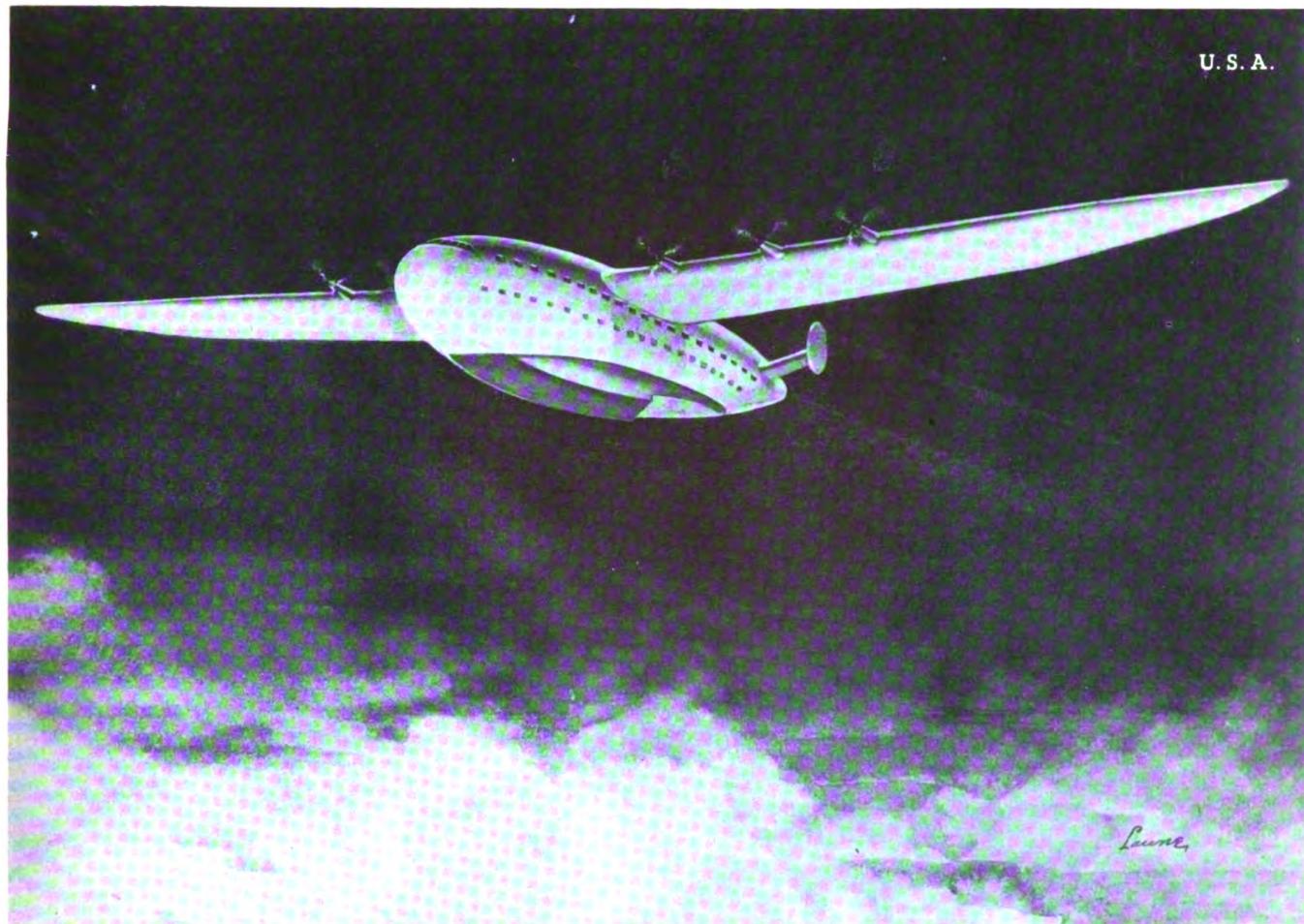


CUTAWAY DIAGRAM OF THE VS-44A "EXCALIBUR" FLYING BOAT

The Vought-Sikorsky VS-44A "Excalibur" flying-boat built for the American Export Lines and now in trans-Atlantic service. It can carry 40 passengers for day-light operations, or 20 passengers with sleeping accommodations, and a crew of five. The wing span is 124 feet, length 79 feet, 3 inches, height 27 feet, 7 inches, gross weight  $28\frac{3}{4}$  tons. Power is supplied by four 1,200-hp. Pratt & Whitney engines. It has a cruising range of 3,800 miles and a speed of 200 m.p.h. Since it is one of the latest transport ships to be built, it incorporates many luxurious accommodations over previous designs.



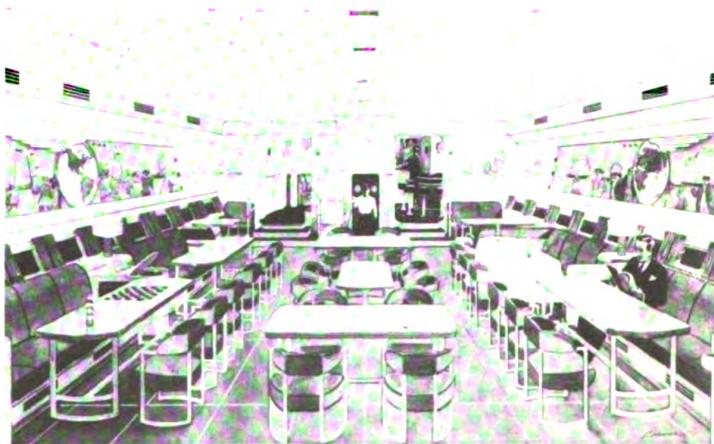
*Work platform design for servicing the Excalibur engines. A portion of the wing section "A" swings down from a hinge near the lower edge ahead of the front spar. Attached to this is a temporary platform "B" suspended by light cables "C." These platforms are located on both sides of each of the four engines.*



ARTIST'S SKETCH OF THE PROPOSED SIX ENGINE VOUGHT-SIKORSKY CLIPPER

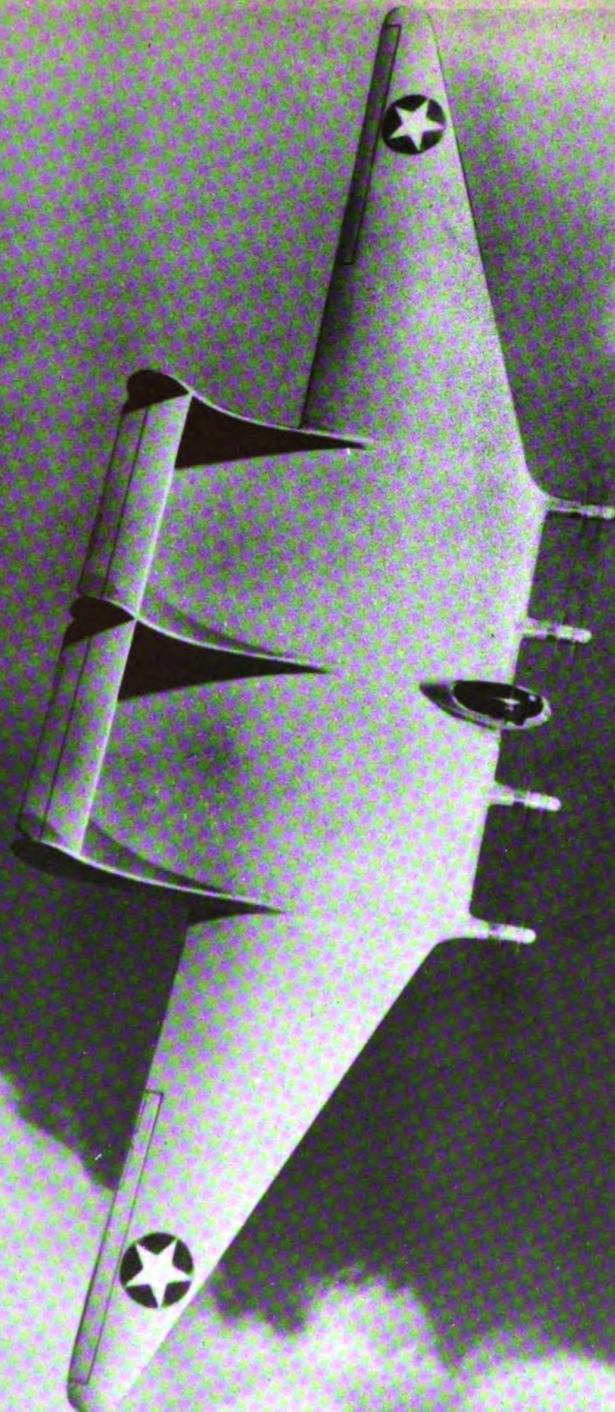
The Vought-Sikorsky design in the Pan American competitive bidding for a 100 passenger, 300 m.p.h. clipper, to carry a

25,000 pound payload for 5,000 miles, is this two-deck six engine luxury airliner.



Luxurious dining salon and cocktail bar of the proposed Vought-Sikorsky super airliner.

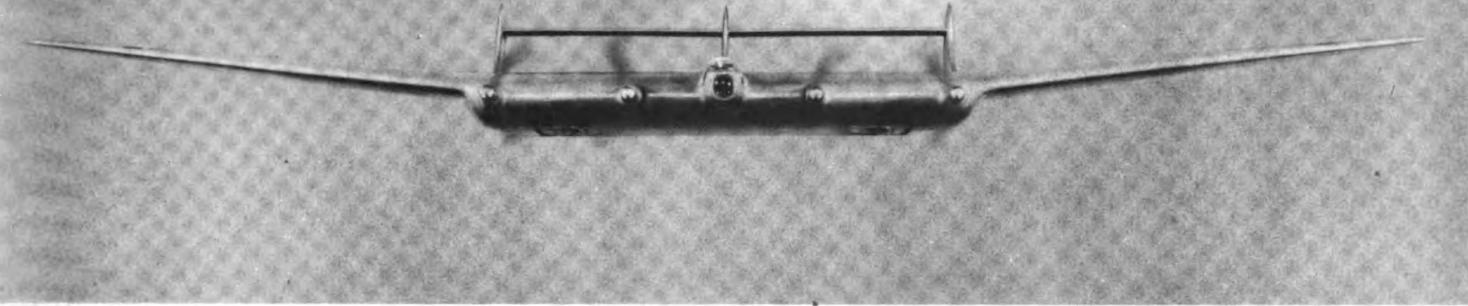
U. S. A.



THE AMERICAN BURNELLI ALL-WING DESIGN

The Burnelli eight-engine 80-passenger all-wing design approaches the ultimate in large transports. It incorporates the

basic advantages in aerodynamics, structure, safety and economy in maintenance, inherent in the Burnelli principal of treat-

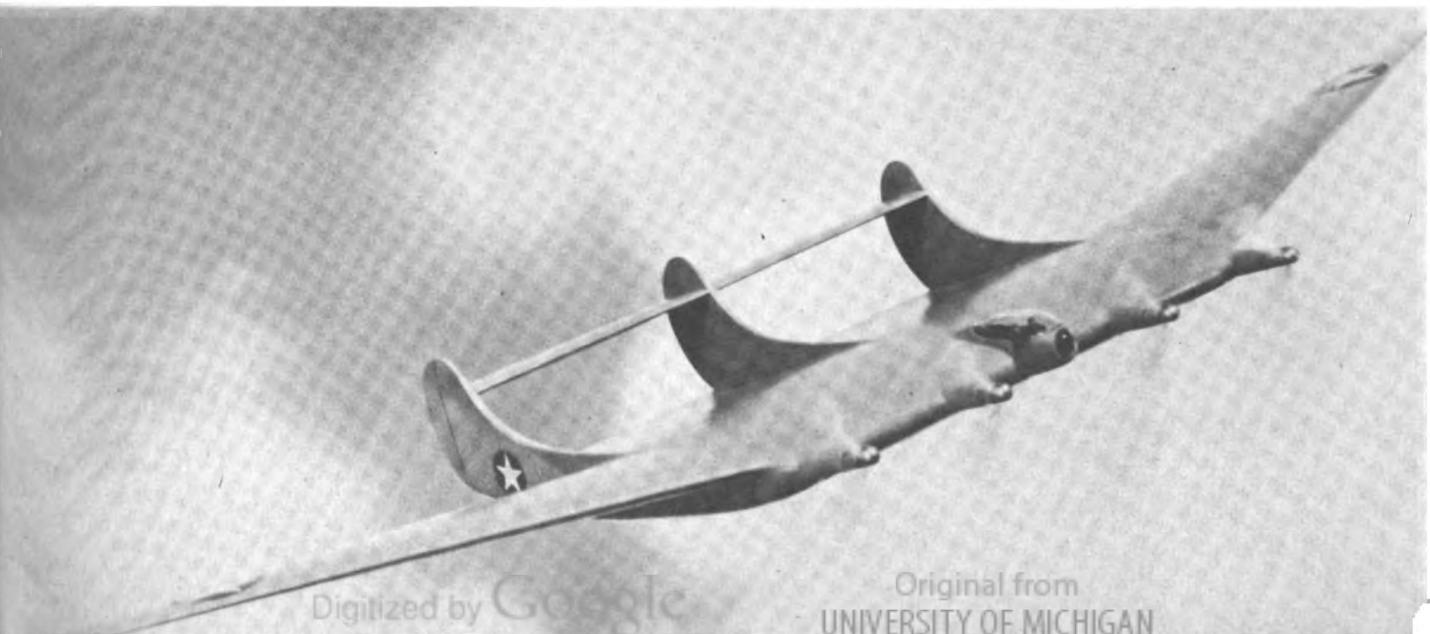


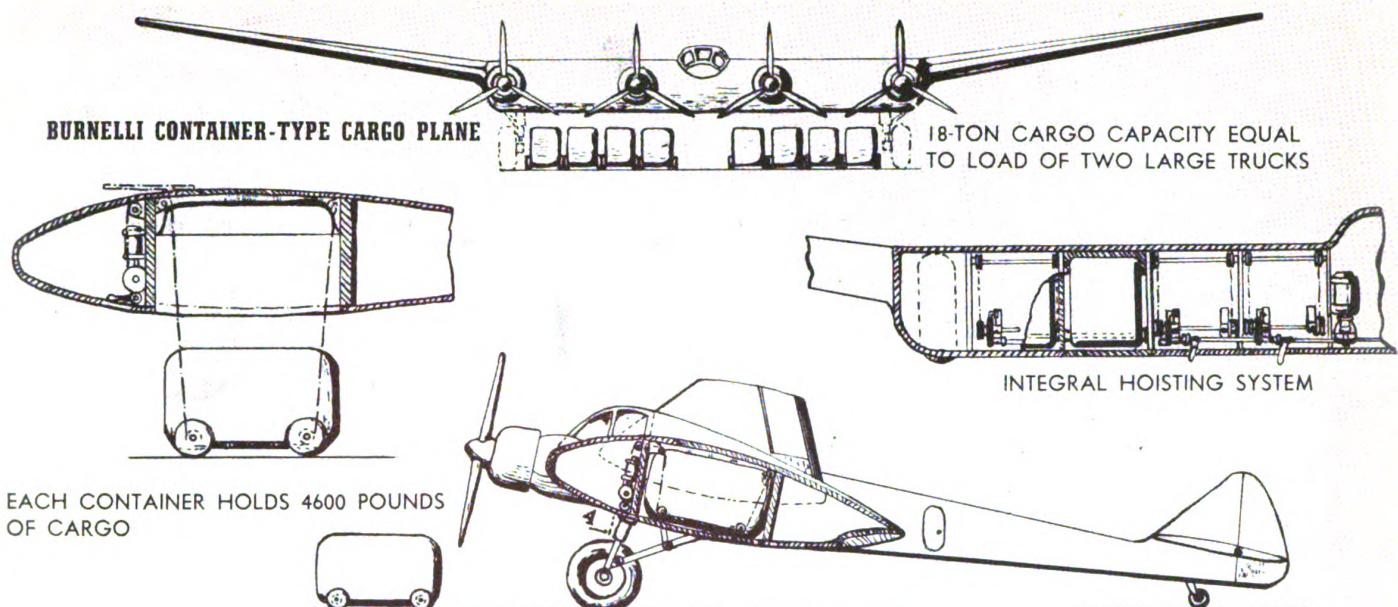
HEAD-ON VIEW OF THE BURNELLI ALL-WING

ing passenger or cargo carrying section as part of the wing. This increases the total lift of the plane 25 per cent (standard fuselage produces no lift and adds a considerable drag on the lifting surface). The Burnelli design has a span of 200 feet and a length of 80 feet. The weight empty is 65,000 pounds and the gross weight is 140,000 pounds. It is powered by eight 2,000-hp. Rolls-Royce "Merlin" engines mounted in twin units, driving four contra-rotating hydromatic propellers. Engines are installed in engine rooms accessible in flight. It has a maximum speed of 310 m.p.h. at 20,000 feet, a cruis-

ing speed of 280 m.p.h., and a range of 4,000 miles, an advanced feature for balance which assists the semi-tailless design is provided by the trailing edge of the lifting fuselage section which is adjustable to change the center of lift. This adjusts for normal shifts of the center of gravity due to load variation of the plane. This is employed in combination with the high lift fuselage flap which extends across the fuselage section in line with the wing flaps.

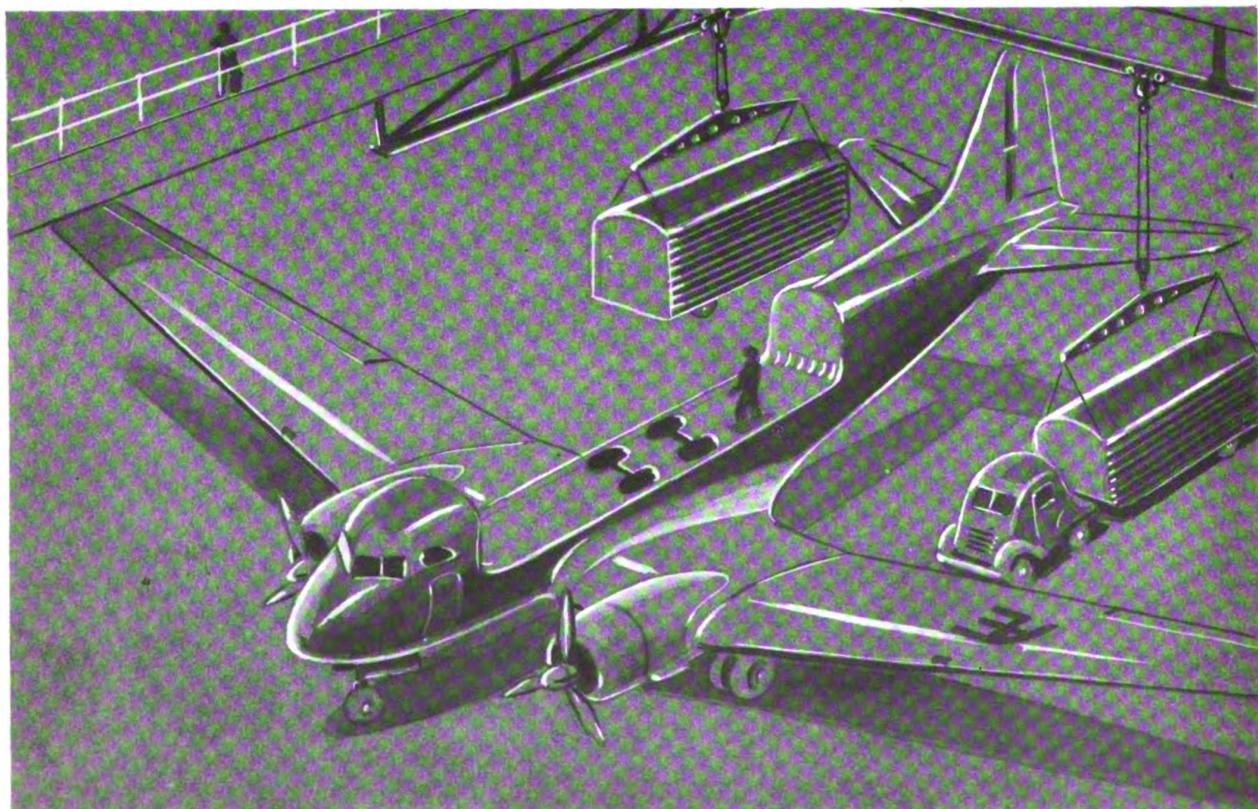
Colonial Airways plan to use this type transport in a Florida to Canada cargo express service.



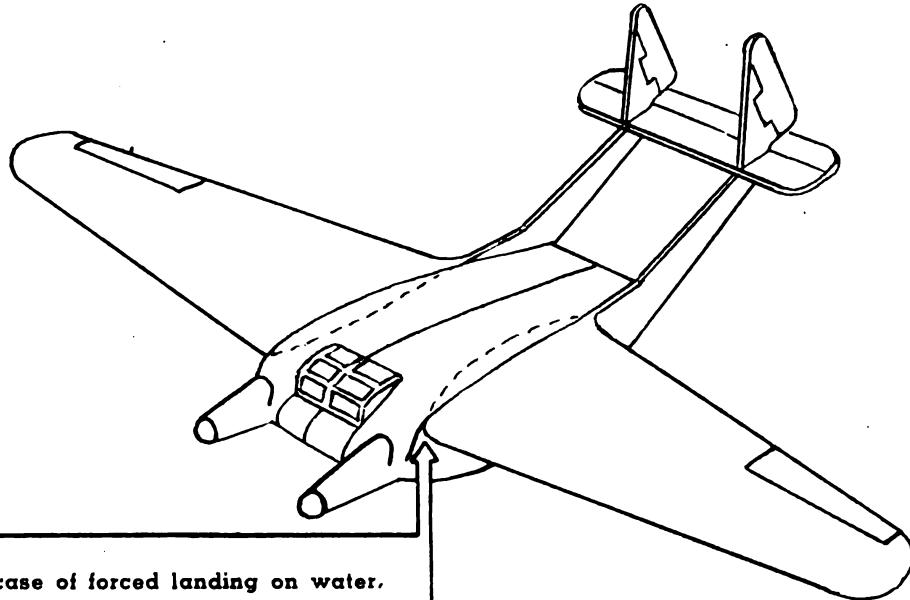


The Fowler plan for handling specially designed trailer trucks to be loaded and unloaded at airports with conventional

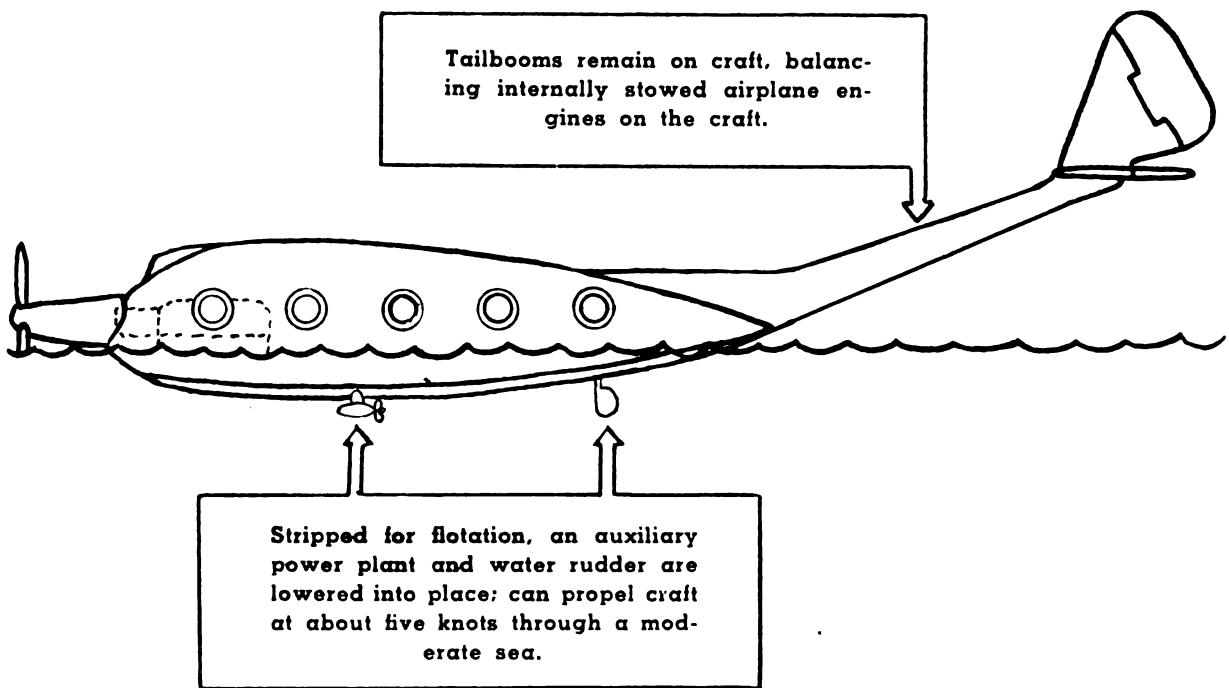
auto trailers. When these units are loaded and attached to the plane, they form the missing portion of the fuselage.



## BURNELLI DESIGN FOR EMERGENCY LANDINGS ON WATER



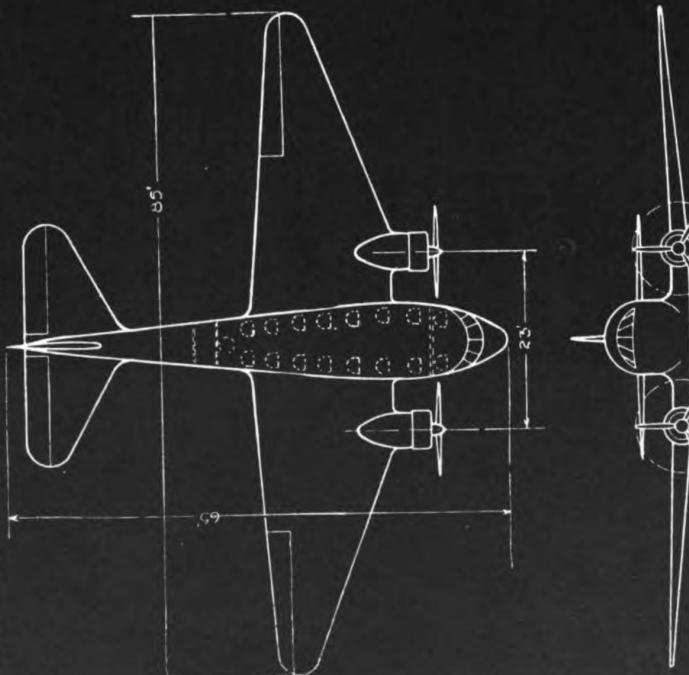
In case of forced landing on water, wings are detached as indicated, turning watertight centersection into hydrodynamically stable liferaft.



Tailbooms remain on craft, balancing internally stowed airplane engines on the craft.

Stripped for flotation, an auxiliary power plant and water rudder are lowered into place; can propel craft at about five knots through a moderate sea.

## The Conventional non-lifting Fuselage design

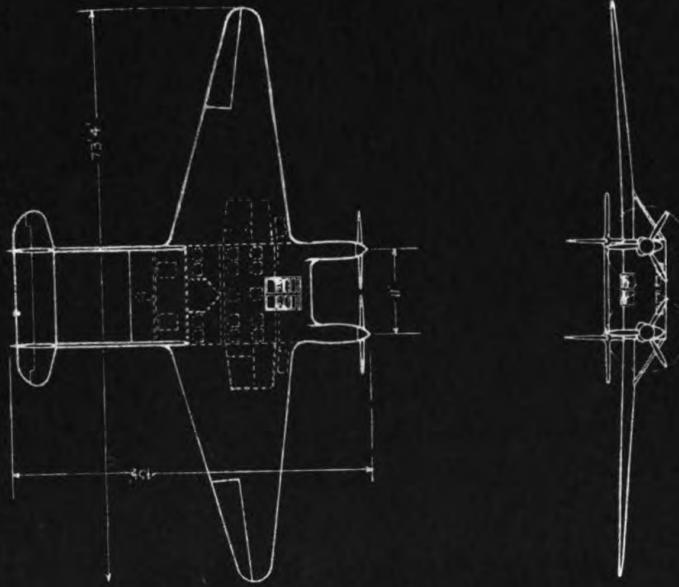


**FUSELAGE** contributes no lifting effect and imposes "dead-weight" on the outboard wings. Structure is not assisted in emergency strength by the major structural members. **ENGINES** mounted on outboard wings must be 20 to 25 feet apart with propellers operating opposite cabin section, and produce maximum turning moment for single engine flight. Engines contribute no emergency protection to fuselage, and are not accessible in flight. **LANDING GEAR** (front wheels retractable) is mounted beneath engine nacelles, requires "low wing" arrangement and imposes no stresses on outboard wings. Design permits "high-wing" arrangement and unobstructed visibility. **NARROW FUSELAGE** restricts passenger comfort and prevents concentration of load area for perfect balance and controllability.

**WEIGHT.** Empty equipped, 12,000 lbs.

**MAXIMUM SPEED.** 210 m.p.h.

## The Burnelli Lifting-Fuselage design



**AEROFOIL FUSELAGE** "lifts" 25 per cent. of entire weight of machine (as approved by the N.A.C.A.), increasing aerodynamic efficiency and reducing bending forces. **ENGINES** mounted close together in nose of fuselage reduce turning moment to a minimum when flying on one engine. Engines contribute protection in emergency. **LANDING GEAR** (all wheels retractable) is mounted directly beneath main body structure and imposes no stresses on outboard wings. Accessible for inspection and adjustment in flight. Design permits "high-wing" arrangement and unobstructed visibility. **WIDE FUSELAGE** (12 feet) provides maximum passenger comfort with improved safety factors. Concentration of load-area provides improved balance and controllability.

**WEIGHT.** Empty equipped, 9,320 lbs.

**MAXIMUM SPEED.** 245 m.p.h.



U.S.A.



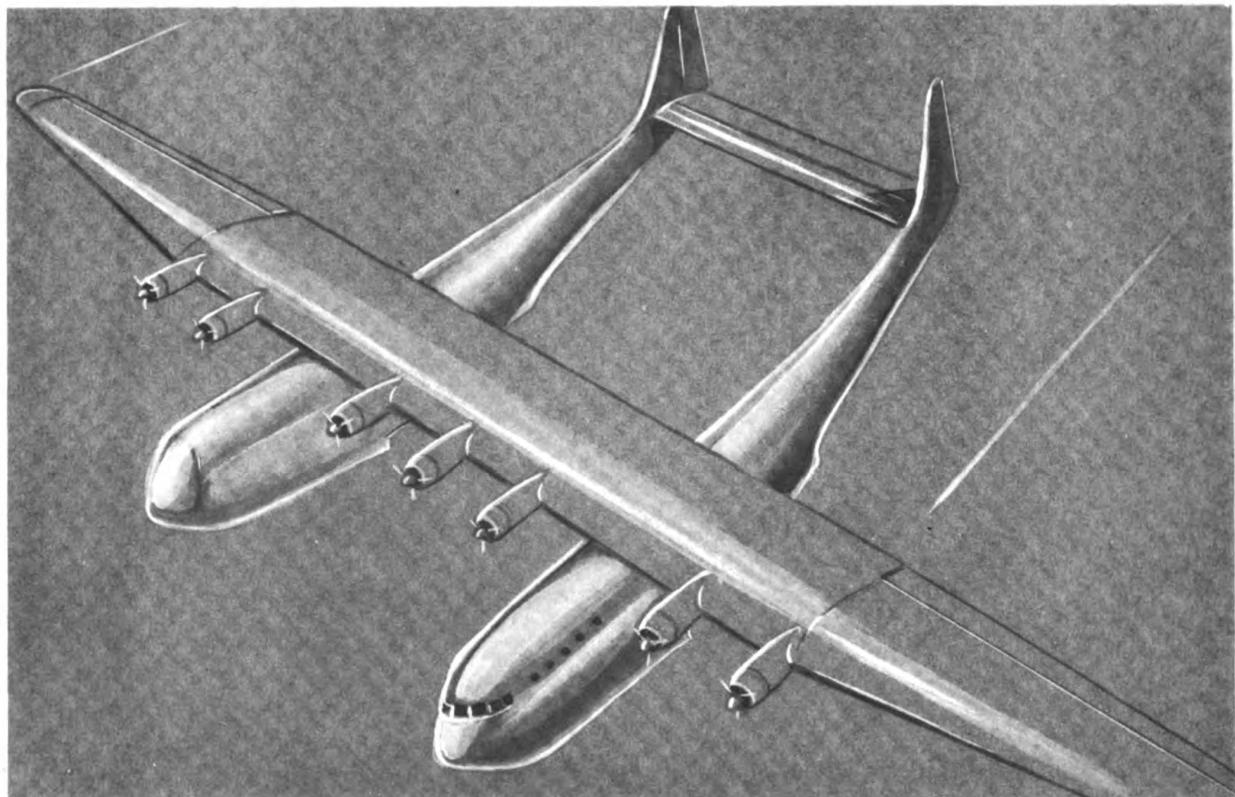
Spacious fuselage provides maximum passenger comfort.

THE UB-14 IN FLIGHT

The American Burnelli UB-14, is a fourteen passenger twin-engine all-wing lifting-fuselage transport. This design of a few years ago was never put into production in this country, however, a similar design was built in England (page 60) and will be produced in Canada also (page 50). The UB-14 is now going through tests as a passenger and cargo transport on South American air routes.

DIAGRAM SHOWING PASSENGER ARRANGEMENT AND FUSELAGE AIRFOIL SECTION



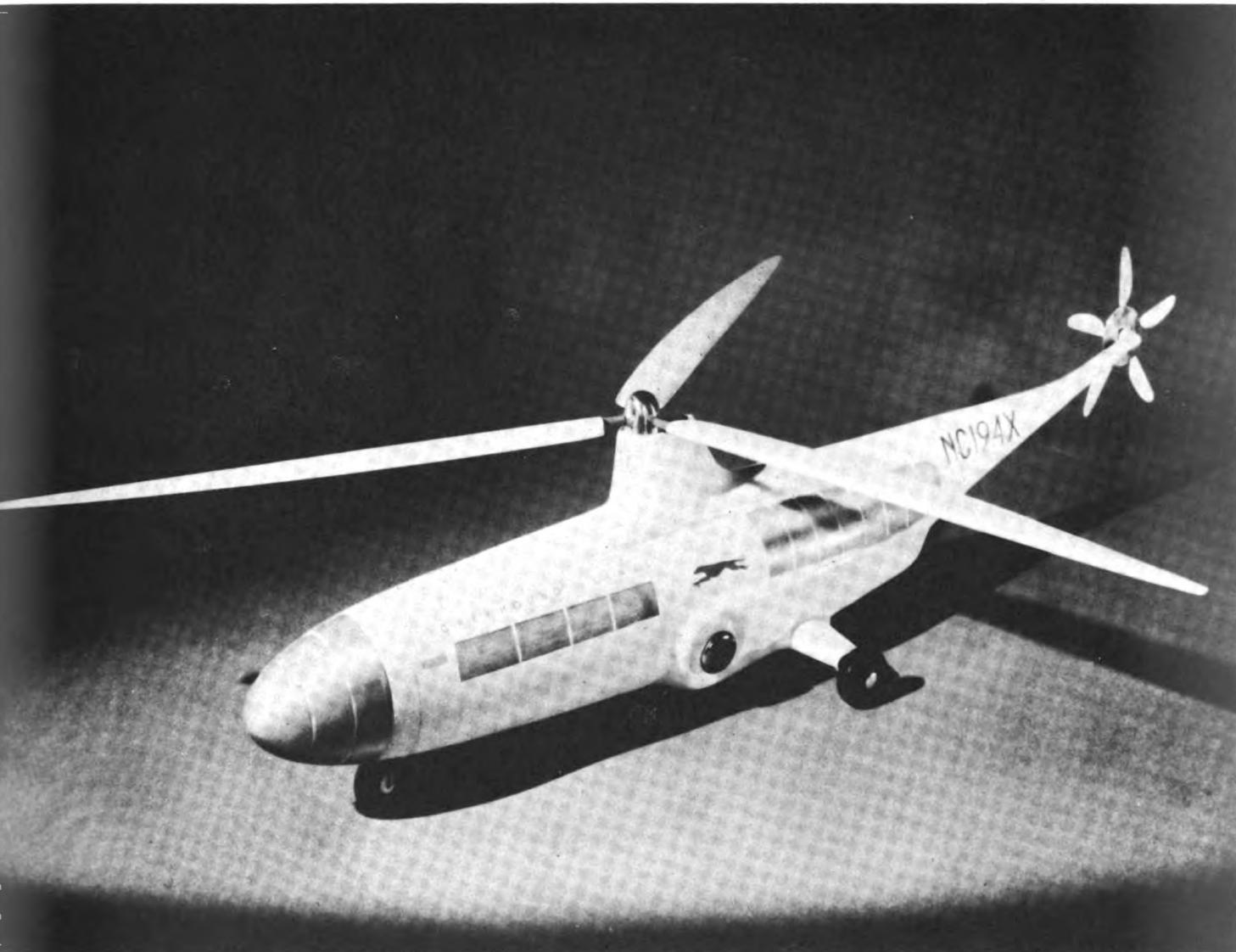


FIRST PLANS FOR TWIN-HULL KAISER "LIBERTY" CARGO DESIGN

Henry Kaiser's "Liberty" cargo plane design is this proposed twin-hull giant flying-boat to be powered by seven engines, and to carry a payload of over 60 tons. The plans are such that one hull will be devoted entirely to cargo space, and the

second will accommodate the pilot, flight engineers and cargo.

The latest Kaiser-Hughes plans are said to call for a more conventional type airplane.



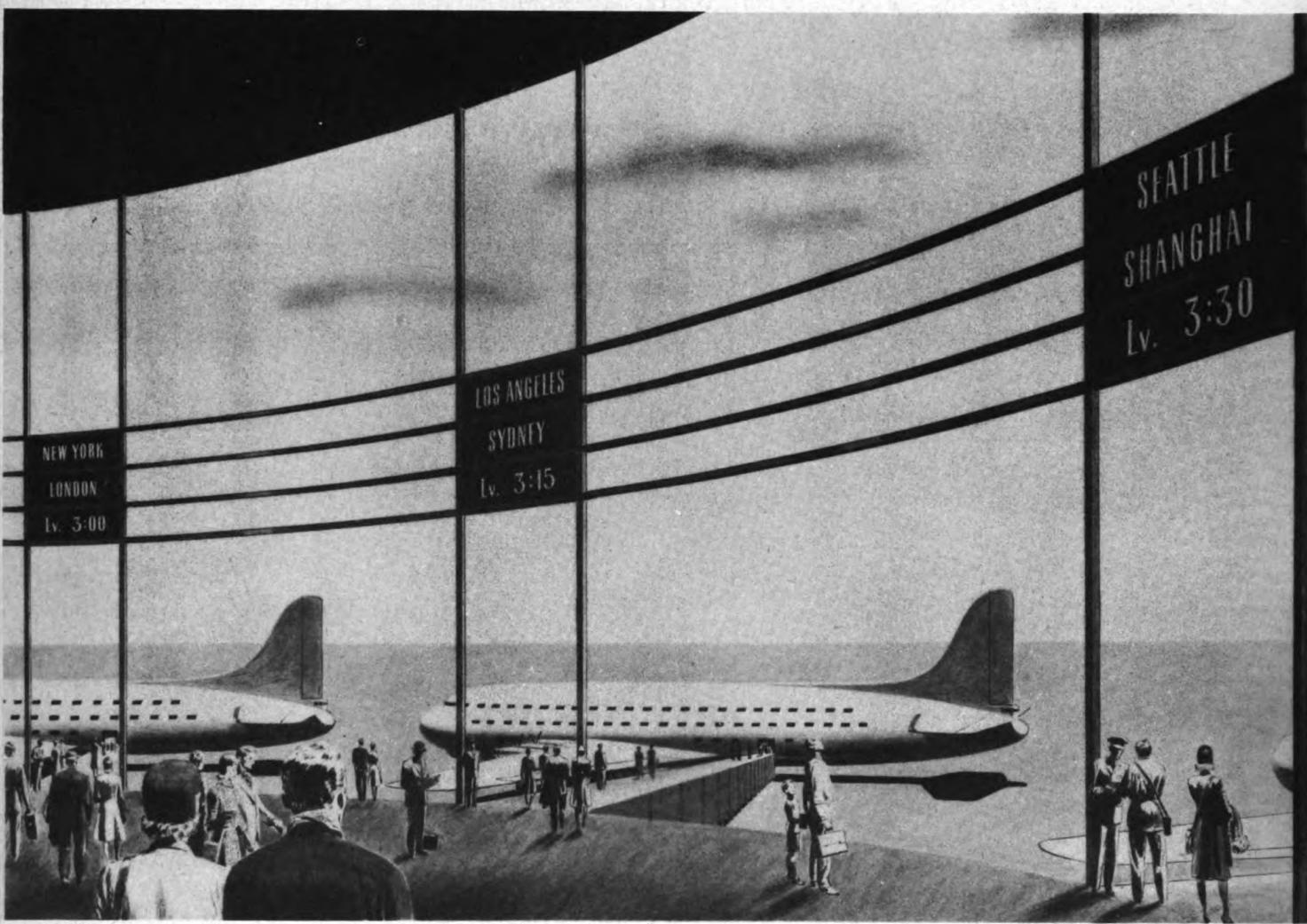
THE GREYHOUND HELICOPTER "AIR BUS" MODEL

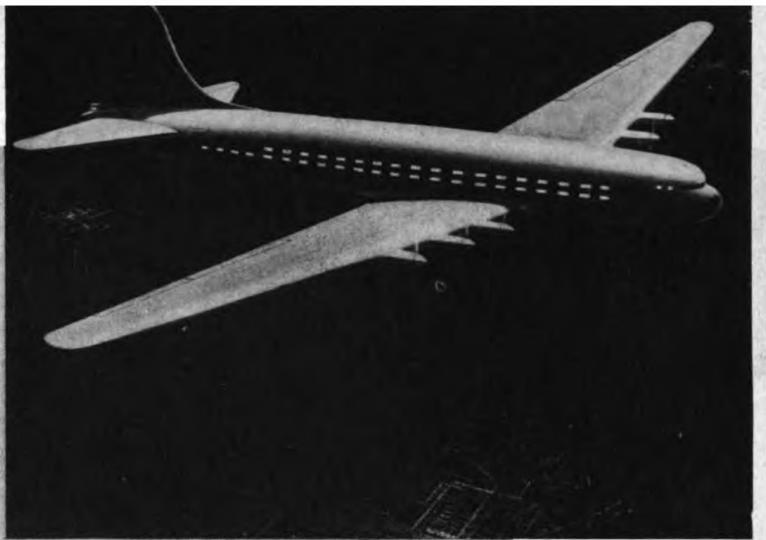
The Greyhound helicopter design of a 14-passenger "air bus." This idea conceived by the Greyhound Corporation, was designed by Raymond Lowey in collaboration with Igor Sikorsky. The Greyhound Lines applied for permission to

operate these helicopters in local air routes.

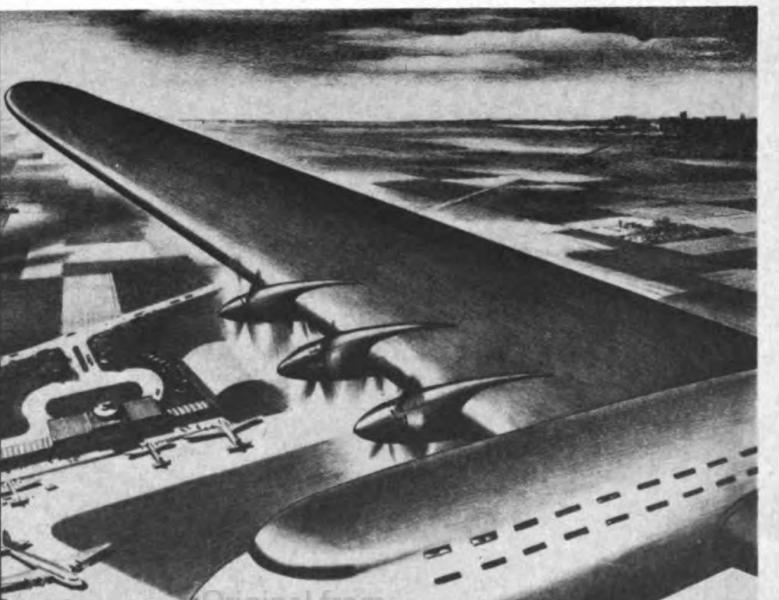
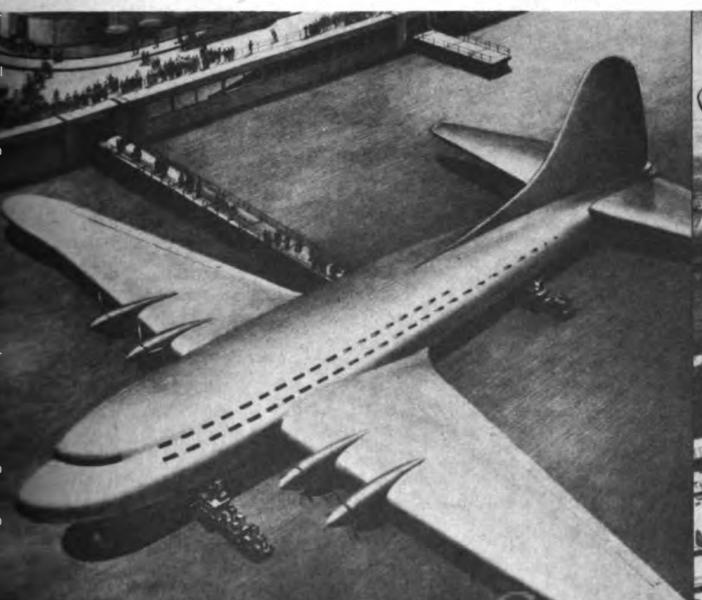
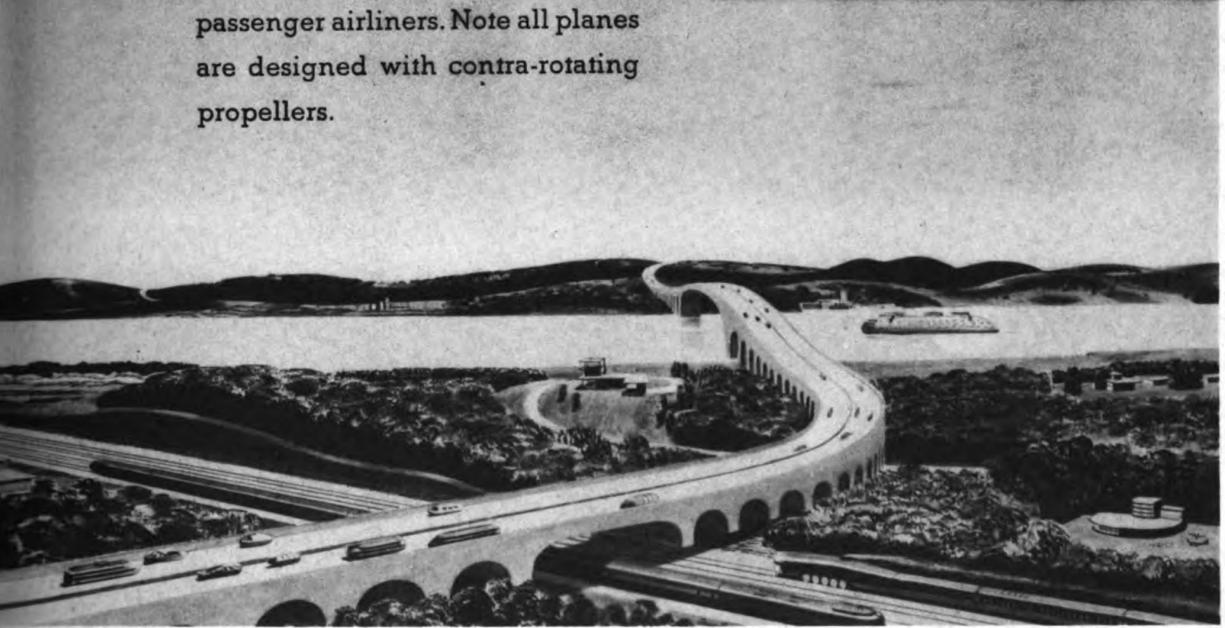
The helicopter will most likely make its debut as a commercial vehicle in a form similar to the Greyhound idea before it will take the place of the family car.

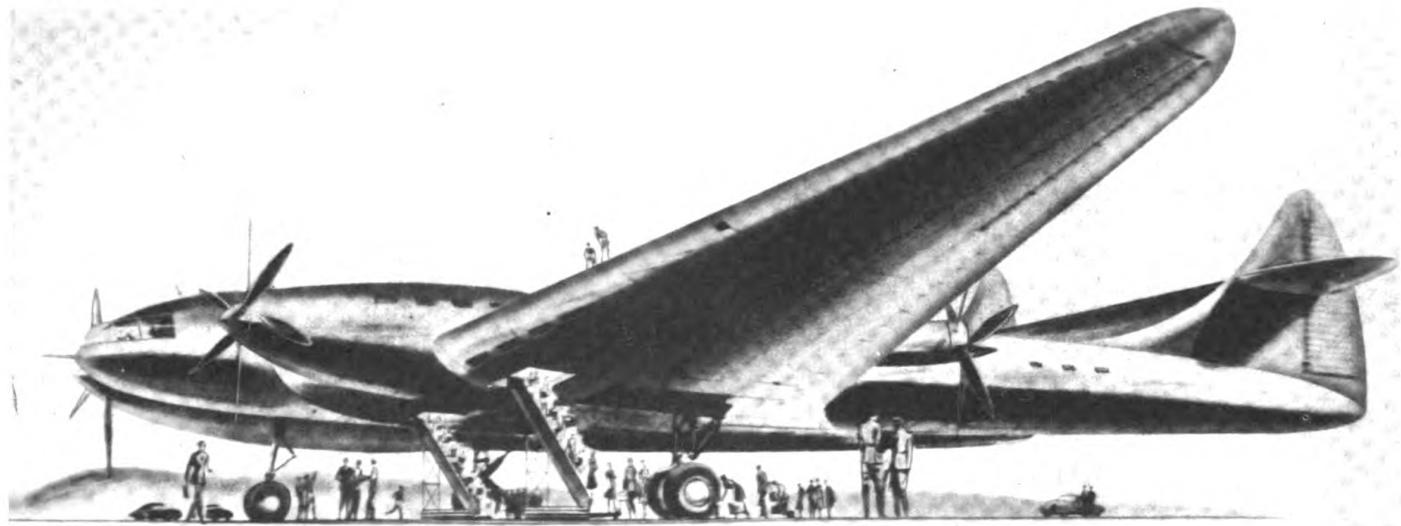
U. S. A.





United Air Lines proposed designs for four and six engine cargo and passenger airliners. Note all planes are designed with contra-rotating propellers.



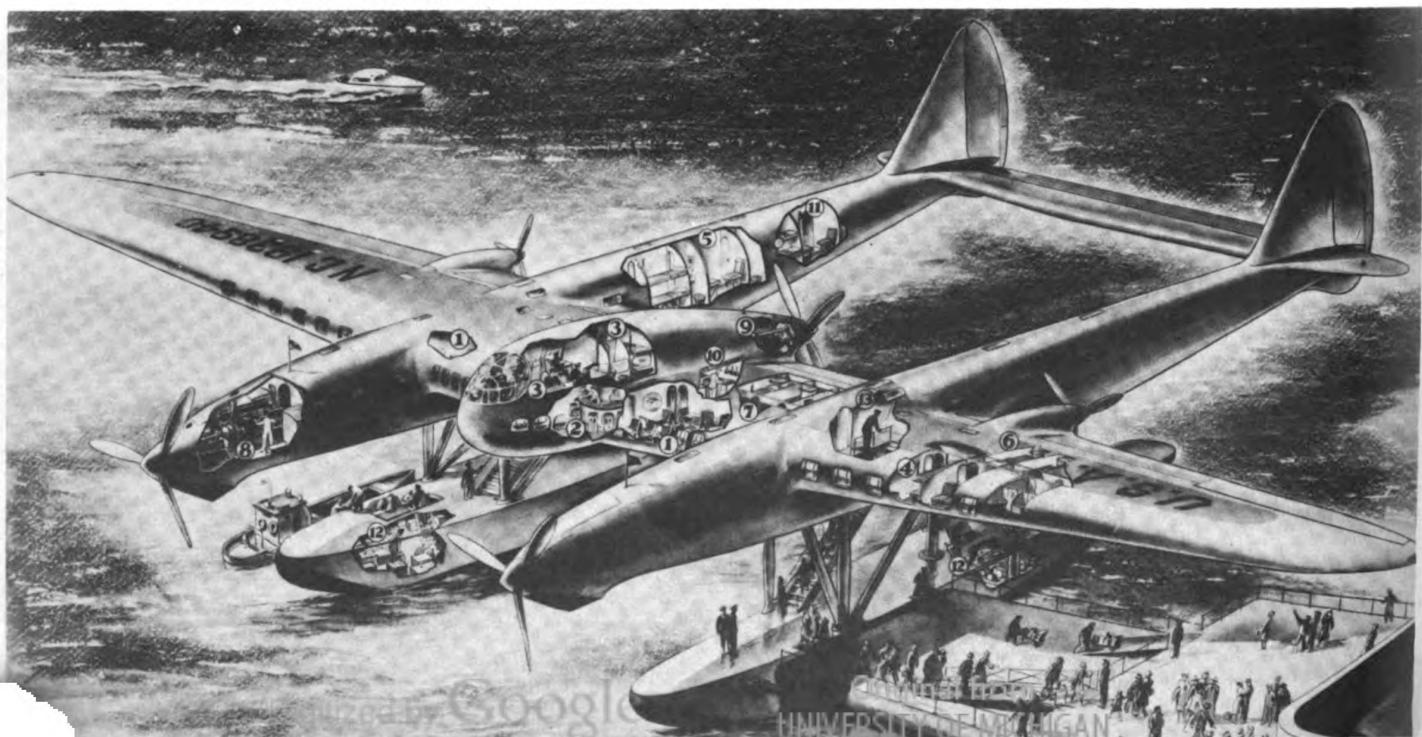


Two Pan-American trans-oceanic transport designs. Above land plane is an artist's conception. Below is the Seversky design. The Seversky clipper is designed to carry 120 passengers, and is powered by eight liquid-cooled engines each developing 2,300 hp. The two forward and

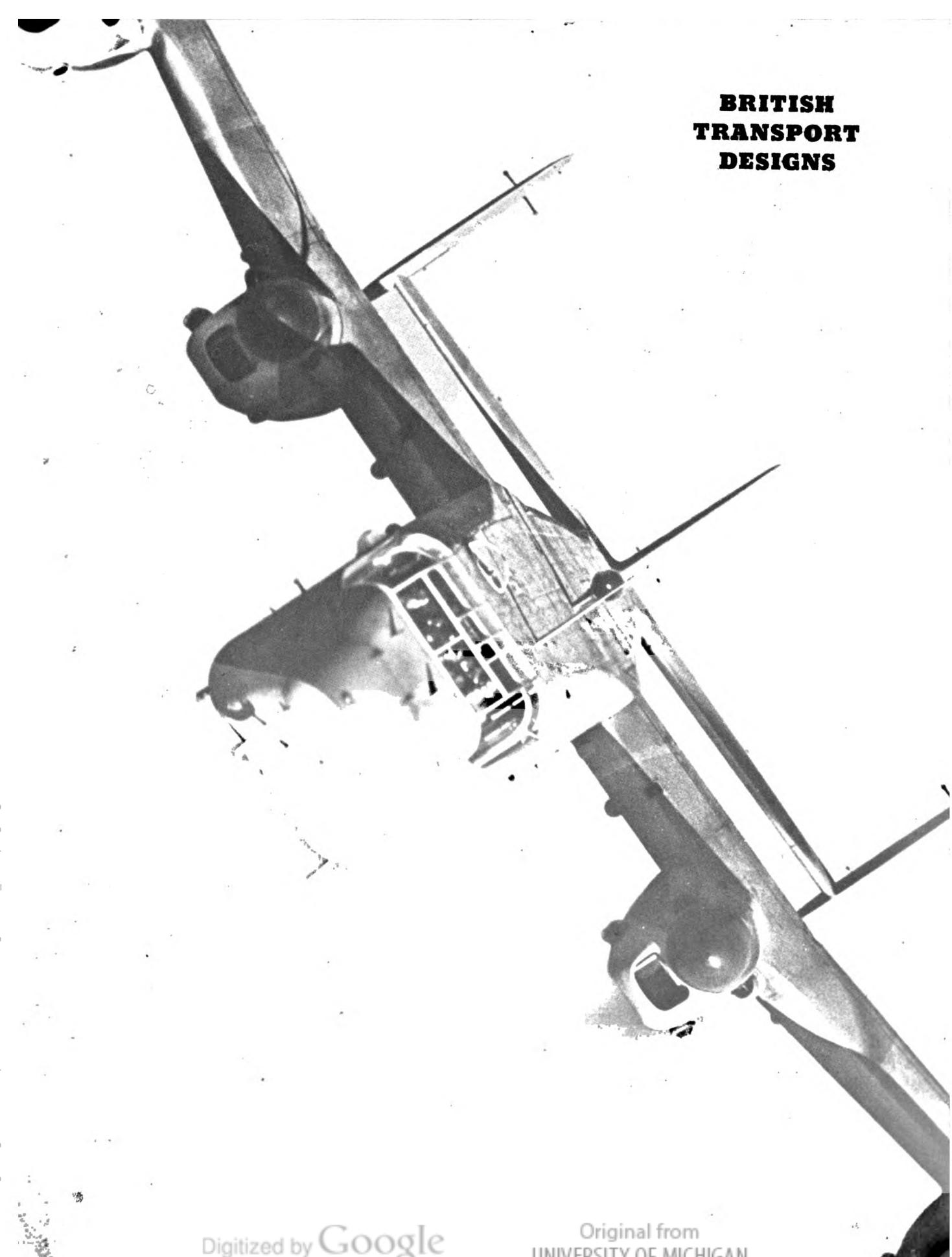
rear center nacelle each have twin-engines driving a single propeller. It has a minimum speed of 250 m.p.h. for a distance of 5,000 miles. The twin-hull clipper is to be constructed of stainless steel. The pontoons retract into the two large fuselages.

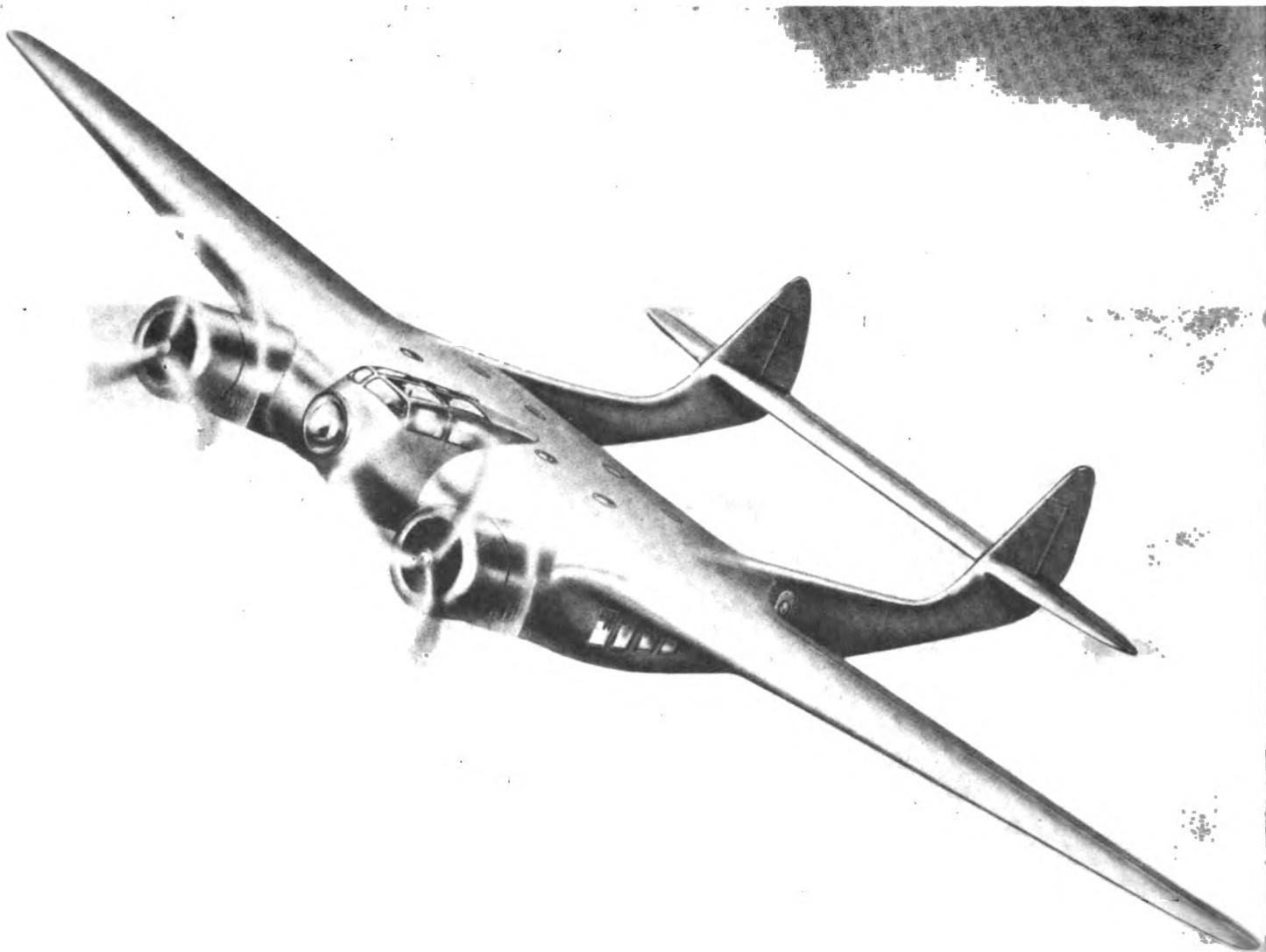
(1) Lounge (2) Bar (3) Flight control bridge and crew sleeping quarters (4) Passenger compartment (5) Suite (6) Single bedrooms (7) Game room (8) Engine room,

forward (9) Engine room, rear (10) Galley (11) Sitting room and bedroom (12) Baggage and freight compartments (13) Stairway to flight deck.



**BRITISH  
TRANSPORT  
DESIGNS**





CANADIAN BURNELLI TRANSPORT

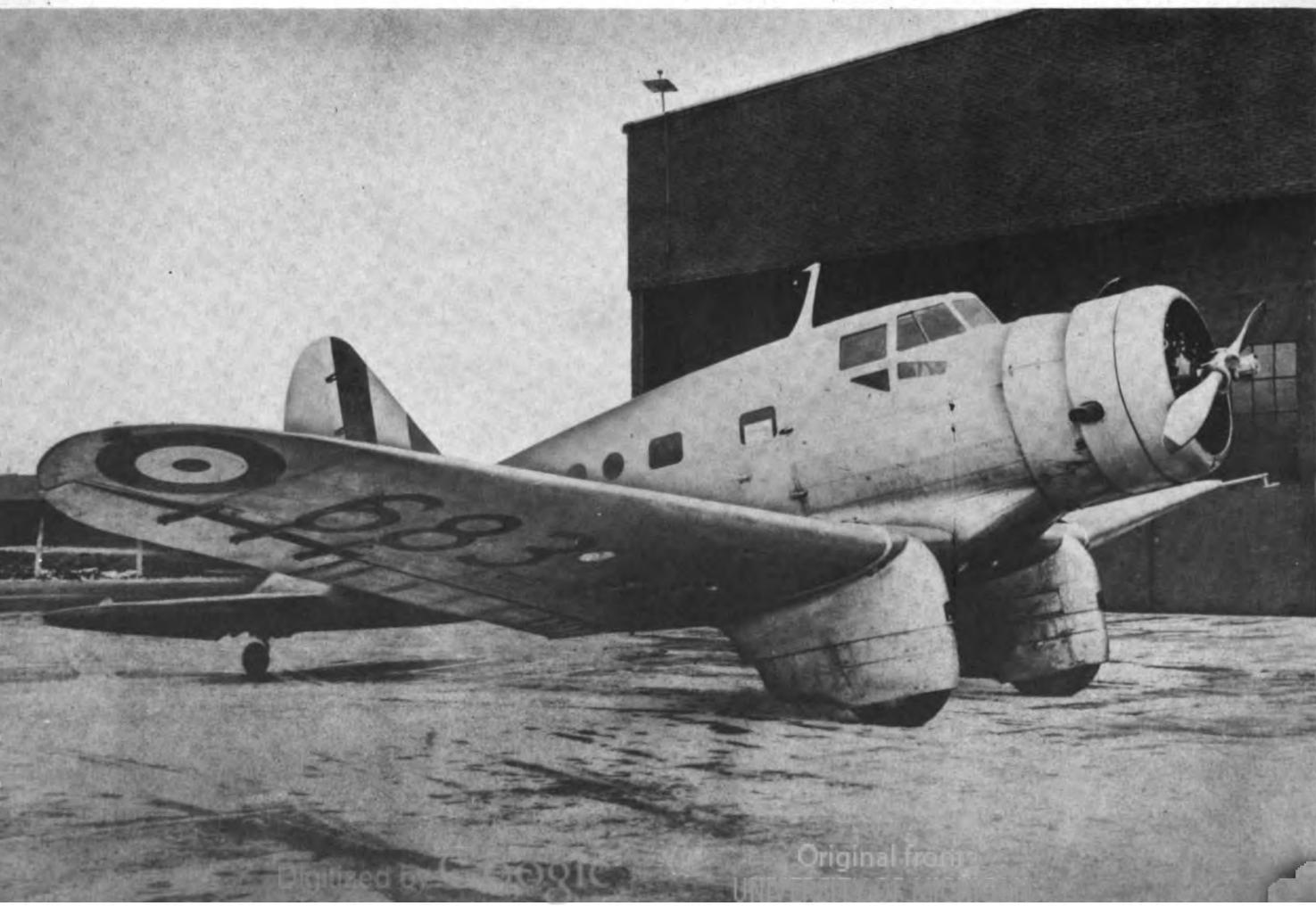
The Canadian Car and Foundry model 'M B-2 is a two-engine cargo and passenger transport. This ship is a Burnelli design, and represents a large improvement over its prototype, the UB-14. The flying-wing has a span of 98 feet and a length of 63 feet. Its cargo space is 2,879 cubic feet. This transport is powered by two 3,000-hp. Wright radial air-cooled engines with an estimated performance of 257 m.p.h. maximum speed, a cruising

speed of 204.5 m.p.h. at fifty per cent power. The service ceiling is 26,950 feet and the range will be about 2,500 miles. The weight empty is 20,850 pounds with a maximum payload of 16,000 pounds. The gross weight is 43,000 pounds. One of the safety advantages of the M B-2 and other Burnelli designs is that 63 per cent of the major structural strength surrounds the cabin section, providing maximum protection for passengers in emergency.

The Canadian Vickers "Delta," an eight passenger transport or cargo carrier used as a land, ski, or sea plane. It is designed from the Northrop "Delta" and is constructed under license from Douglas Aircraft Co. Small transports of this type have proven to be satisfactory carriers in

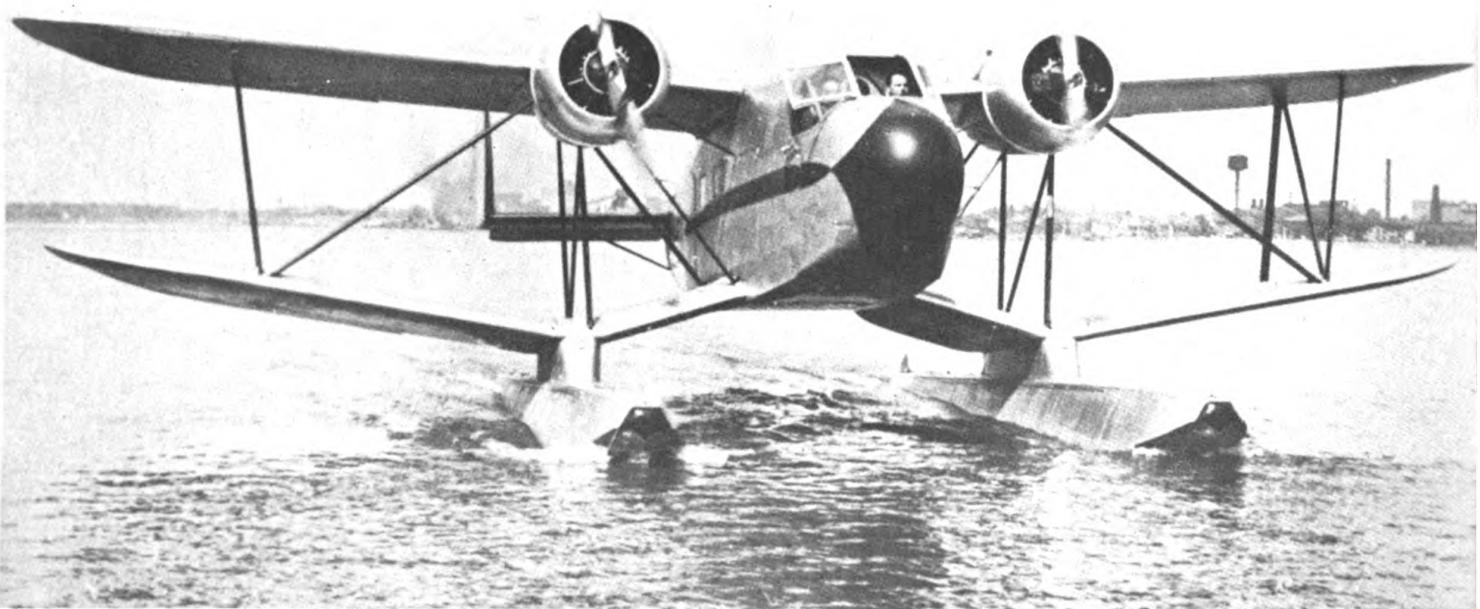
the Canadian territory. Powered by a Wright "Cyclone" engine of 775 hp. with a top speed of 213 m.p.h., and a service ceiling of 23,000 feet (land plane). Empty weight (land plane) 4,410 pounds, gross weight (land and ski plane) 7,350 pounds.

THE VICKERS "DELTA" SHOWN AS A LAND PLANE



The Fleet 50 K, a twin-engine ten passenger airliner and cargo carrier, is used as either a land plane or seaplane. This biplane has a wing span of 45 feet, an overall length of 36 feet, and a height of 13 feet, 6 inches. The empty weight as a

cargo carrier land plane is 4,600 pounds, as a seaplane 4,975 pounds. The empty weight as an airliner land plane is 5,100 pounds, as a seaplane 5,475 pounds, and the total weight is 8,326 pounds.



THE FLEET 50 K SHOWN AS A SEAPLANE

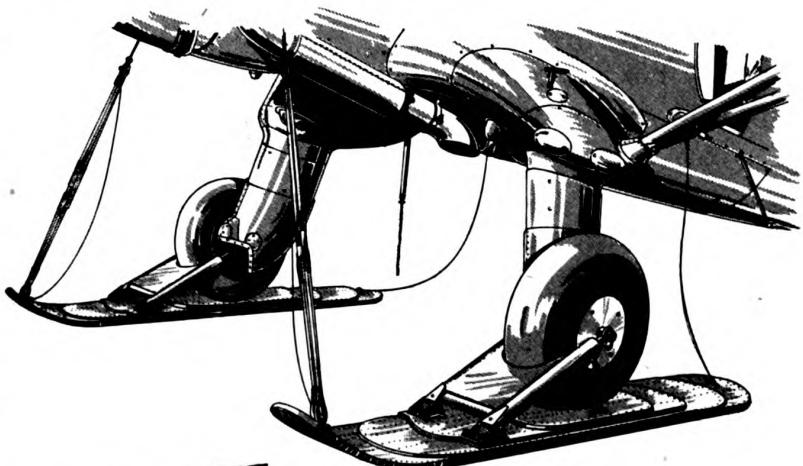
The fuselage is of metal construction, and the wings are metal and fabric covering over a wood and metal structure. It is powered by two 330-hp. Jacobs L-6BM engines. As a land plane, the top speed is 150 m.p.h., and the cruising speed is

132 m.p.h. The top speed and cruising speed is 2 m.p.h. less as a seaplane. As a land plane the service ceiling is 15,000 feet and as a seaplane 14,000 feet. The maximum range as a land plane is 950 miles, and as a seaplane 936 miles.

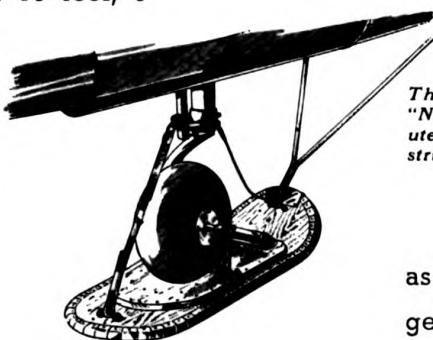


THE NOORDUYN NORSEMAN MK. IV SHOWN AS A SKIPLANE

The Noorduyn Norseman MK. IV is a single engine, 10 passenger airliner or cargo transport. This high wing monoplane has a welded steel structure with fabric covering. The divided-type landing gear is easily interchangeable for floats or skis. The "Norseman" has a wing span of 51 feet, 6 inches, a length of 31 feet, 8 inches, and a height of 10 feet, 1 inch. The empty weight as a (cargo) land plane is 3,758 pounds, as a seaplane 4,225 pounds, and



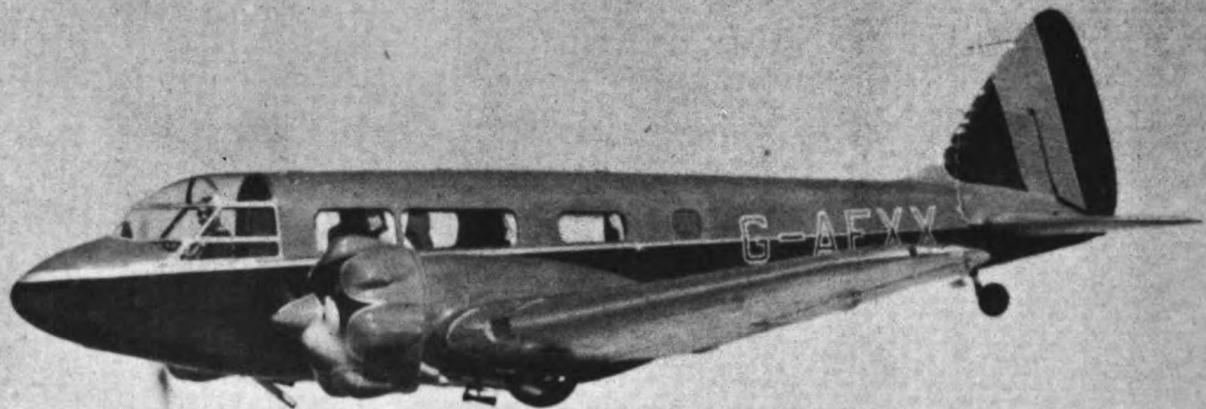
*The tail and wheel skid landing gear combinations of the "Norseman" are designed so that it requires only 20 minutes to change from one to the other. The skis are constructed of wood with metal covering.*



The "Norseman" shown as a land plane.



as a skiplane 4,010 pounds. As a (passenger) land plane it weighs 3,816 pounds, as a seaplane 4,280 pounds, and as a skiplane 4,068 pounds. The gross weight is 6,450 pounds. It is powered by a Pratt & Whitney "Wasp" S3H1 engine of 550 hp. with a maximum speed of 170 m.p.h., a maximum range of 600 miles, and a service ceiling of 20,000 to 22,000 feet.

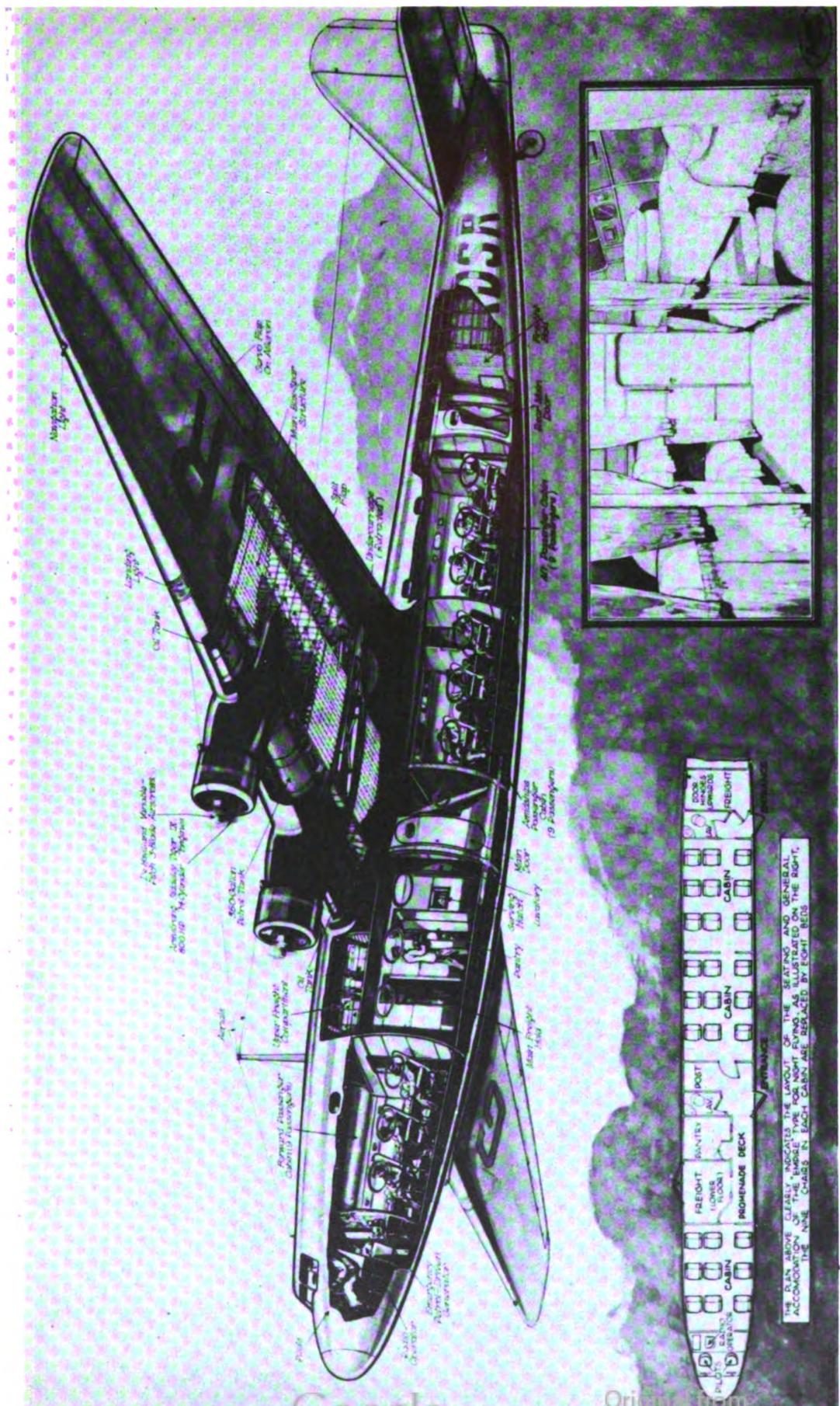


THE AIRSPEED "ENVOY" III

The Airspeed "Envoy" III, a twin-engine transport which carries from six to eight passengers and a crew of 1. Constructed mainly of plywood. The "Envoy" is powered by two Armstrong-Whitley "Cheetah" IX engines of 350 hp. with a maximum speed of 203 miles per hour, and a range of 630 miles. Wing span 52 feet, 4

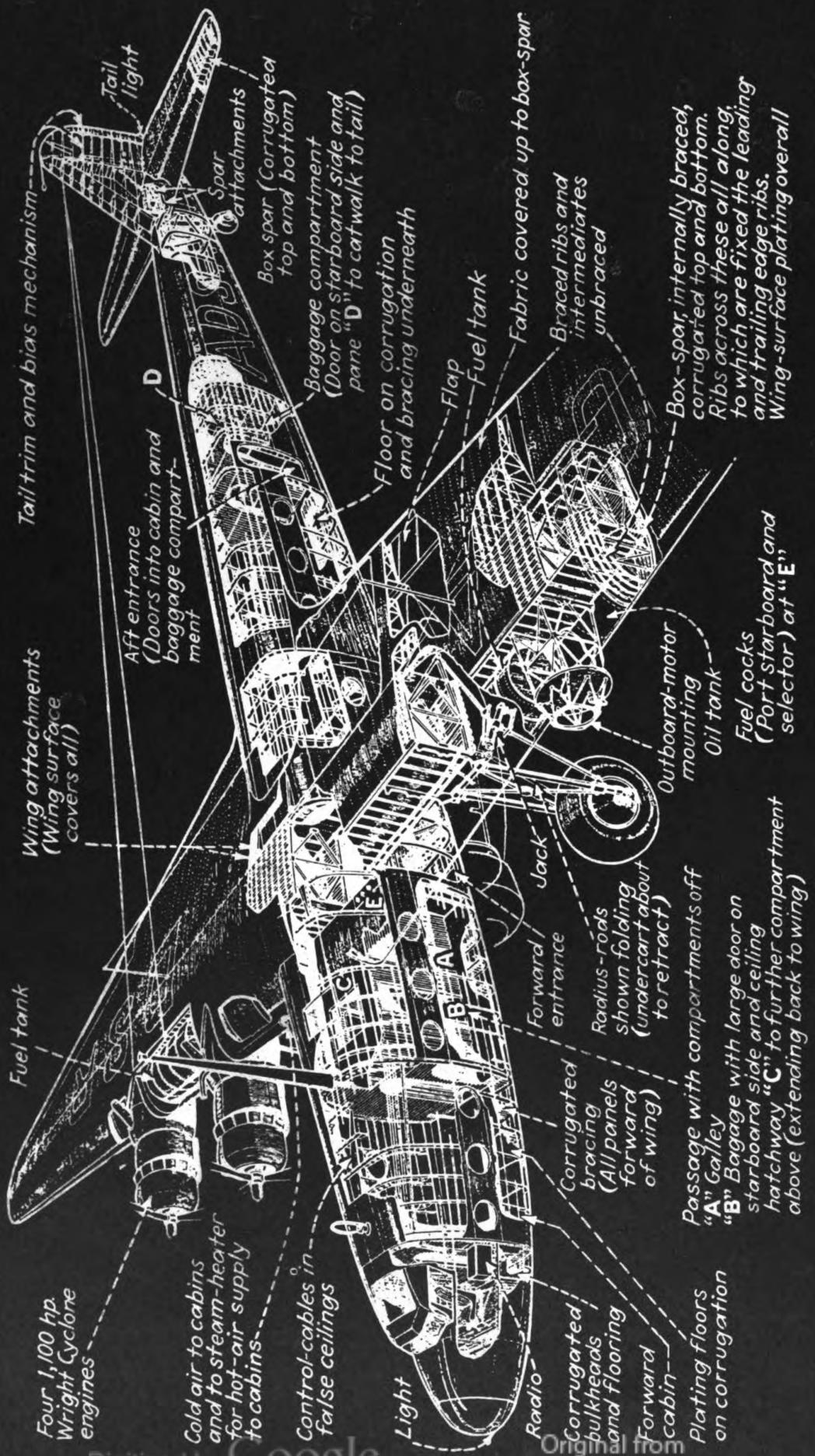
inches, length 34 feet, 6 inches, height 9 feet, 6 inches, empty weight 4,340 pounds, and weight loaded 6,600 pounds.

England uses a number of these relatively small aircraft in short routes. The "Envoy" pictured here is the private transport of King George.



FROM "FLIGHT" London

DIAGRAM AND PLAN VIEW OF THE ARMSTRONG-WHITWORTH "ENSIGN"





THE ARMSTRONG-WHITWORTH "ENSIGN" IN FLIGHT

The Armstrong-Whitworth A.W.27 "Ensign," a four-engine all-metal transport which carries a crew of five. In the pre-war days this ship carried 25 passengers on the England-India route, and 40 pas-

sengers on the London-Paris run. Powered by four Wright "Cyclone" radial air-cooled engines. It has a cruising speed of 180 miles per hour, and a cruising range of 800 miles. Absolute ceiling is 18,000 feet. This high-wing monoplane has a wing span of 123 feet, length 111 feet, height 22 feet. It has a useful load of 15,500 pounds, and its gross weight is 48,500 pounds.



The giant landing gear of the "Ensign" is shown by comparison with automobile alongside.

Original from  
UNIVERSITY OF MICHIGAN

ROLLS-ROYCE "MERLIN" ENGINE, THE  
SAME TYPE AS THAT USED ON THE  
AVRO YORK

Place for auxiliary gun-turret pump  
(Driven off valve rocker spindle)

Coolant return from carburetors

Inlets to pairs of cylinders  
Inlet manifold

Coolant outlet pipes

Propeller drive  
and front races  
(Roller and ball)

Protection cap

Roller bearing

Propeller driving  
pinion, E

Motor mounting

Crankshaft drives self-alignment  
shaft C through male and female  
pinions A and B. Shaft C drives  
pinion E through D

Timing-disk inspection plug

Sump and suction pipe

Oil-supply main

Portion of bearing cap

Oil-splash baffle plate

Transverse  
Motor mounting

Lockhead pump

Coolant supply to cylinder jacketing

Oil pump unit

Coolant return piping systems

Coolant inlet piping system  
to carburetor choke jacketing

Oil filters

Coolant pump

Diffuser vanes

Carburetors

Warm scavenging oil circulating through  
throttle and throttle spindle

Connected coolant outlet above)

RE-DRAWN FROM THE AEROPLANE BY AVIATION

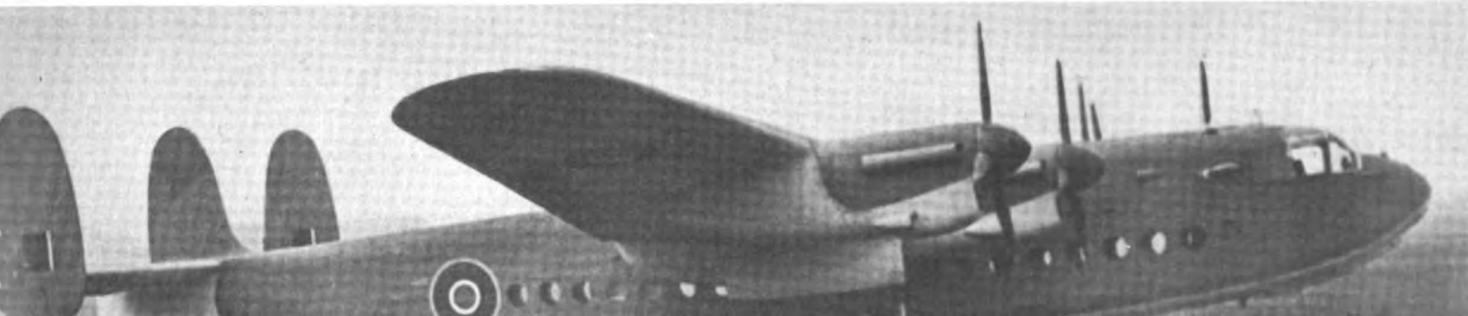


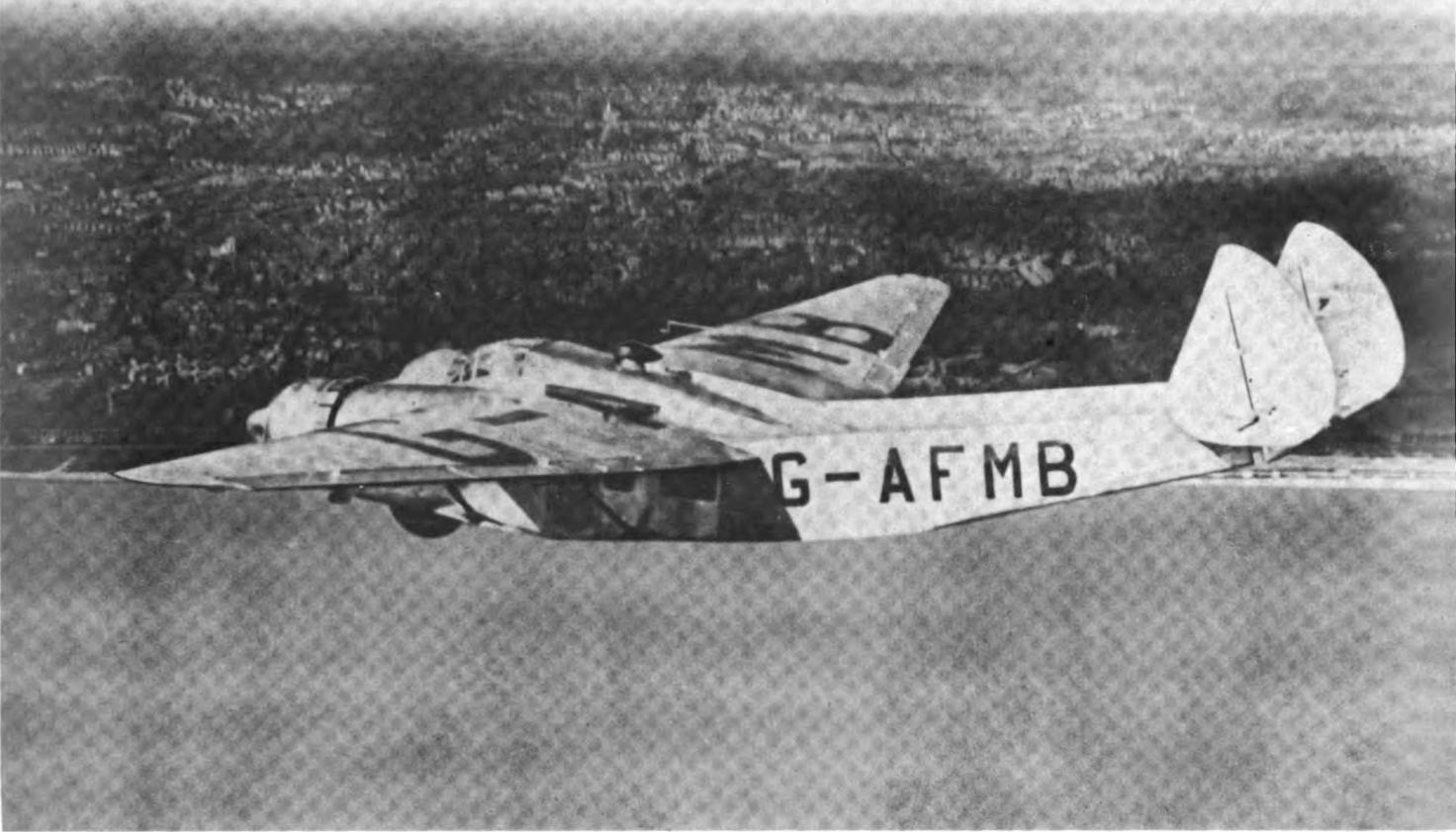
THE AVRO YORK ON ITS FIRST FLIGHT

The Avro York, Great Britain's newest airliner, will compete with United States transports in the immediate post-war period. This high-wing monoplane is powered by four Rolls-Royce "Merlin" engines, and will accommodate 50 to 56 passengers. It has a wing span of 102 feet,

and a length of 78 feet.

This large transport is a civil version of the famous Avro Lancaster bomber. The main points of difference between the York and the Lancaster are: the shape of the fuselage and the introduction of a triple fin and rudder.

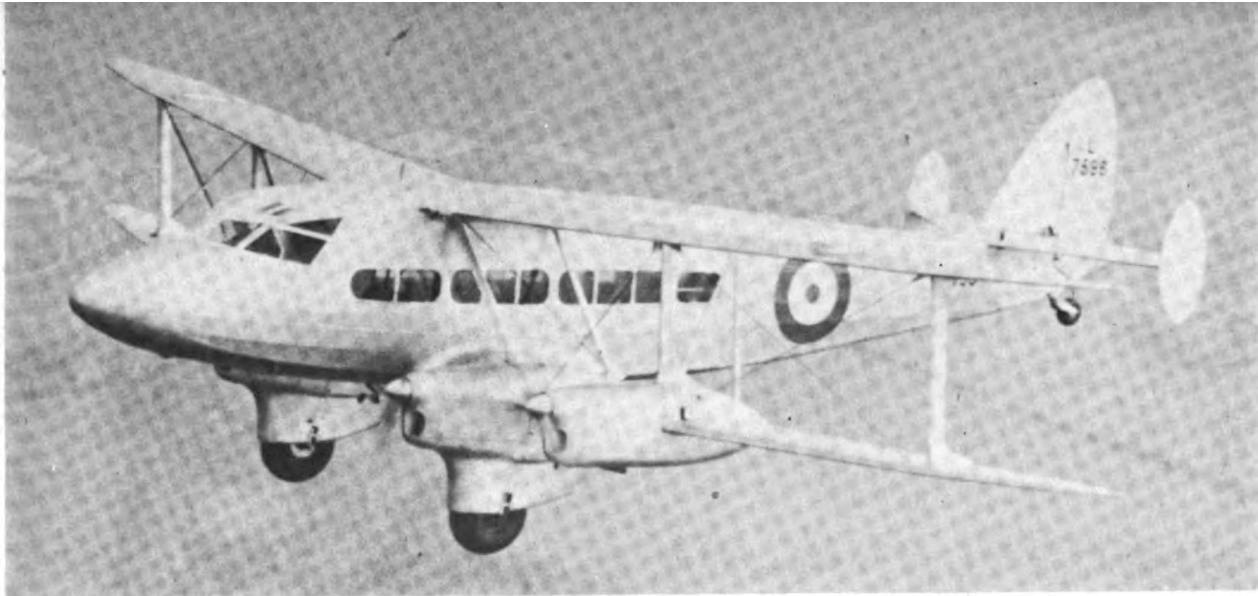




THE CUNLIFFE OWEN FLYING WING

The Cunliffe Owen Flying Wing OA Mk-II "Clyde Clipper" is a 20 passenger transport built under American Burnelli license. The craft has a span of 73 feet, an overall length of 45 feet, 2 inches, and a height of 12 feet. The empty weight is 10,000 pounds, the payload is 4,000 pounds

and the gross weight is 20,000 pounds. The "Clyde Clipper" is powered by two Bristol "Perseus" XIVc engines of 710 hp. each. It has a top speed of 235 m.p.h., a cruising speed of 195 m.p.h., a service ceiling of 22,000 feet, and a maximum range of 1,950 miles.



THE DE HAVILLAND "EXPRESS AIRLINER"

The DeHavilland "Express Airliner" Dh 86 B, carries 10 to 12 passengers. These four engine bi-planes have been in service on the Quantas Airways of Australia for inland routes. Powered by four 200-hp. DeHavilland "Gypsy" Six I engines. It has a wing span of 64'-6", length 46'-1 $\frac{1}{2}$ ", and

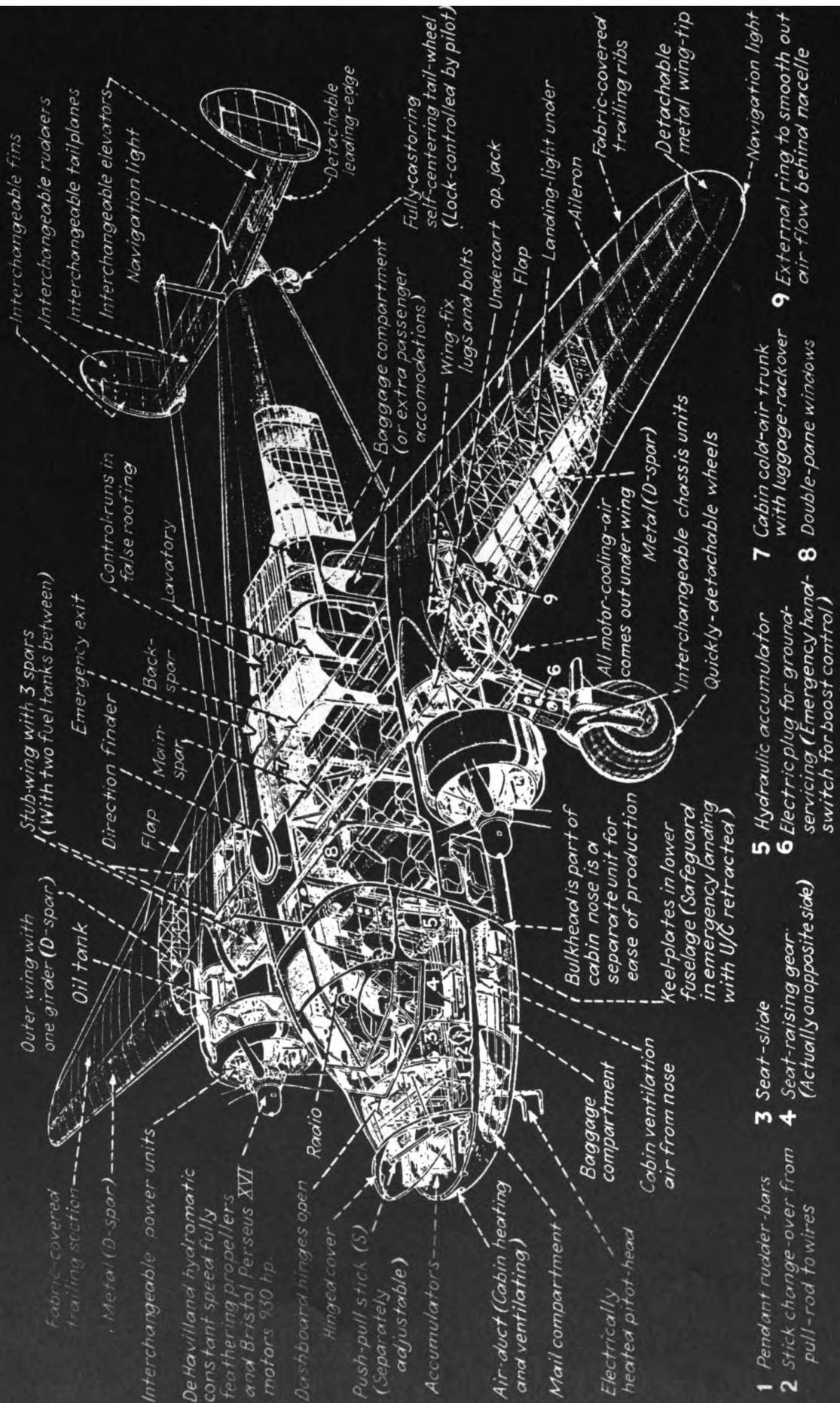
height 13'-10". Top speed is 166 m.p.h., cruising speed 142 m.p.h., cruising range 750 miles. Weight empty is 6,250 pounds, weight loaded 10,250 pounds. It has a service ceiling of 17,400 feet. The fuselage is constructed of wood with plywood skin. Wings are plywood, and fabric covering.

The DeHavilland D.H. 89 A "Dragon Rapide," a twin-engine bi-plane, which carries from six to eight passengers. Fleets of these planes are in use by the Rumanian and Turkish State Airlines. The "Dragon Rapide" is constructed of wood and plywood externally faired with fabric. It has a wing span of 48 feet, an overall length

of 34 feet, 6 inches, and a height of 10 feet, 3 inches. The D.H. 89 A is powered by two DeHavilland "Gypsy" Six I engines of 200-h.p. each. It has a maximum speed of 157 m.p.h., a cruising speed of 132 m.p.h., a service ceiling of 16,700 feet and a cruising range of 556 miles.

THE DE HAVILLAND "DRAGON RAPIDE"





## CUTAWAY VIEW OF THE DE HAVILLAND "FLAMINGO"

Digitized by Google

Original from  
UNIVERSITY OF MICHIGAN

RE-DRAWN FROM THE AEROPLANE BY AVIATION



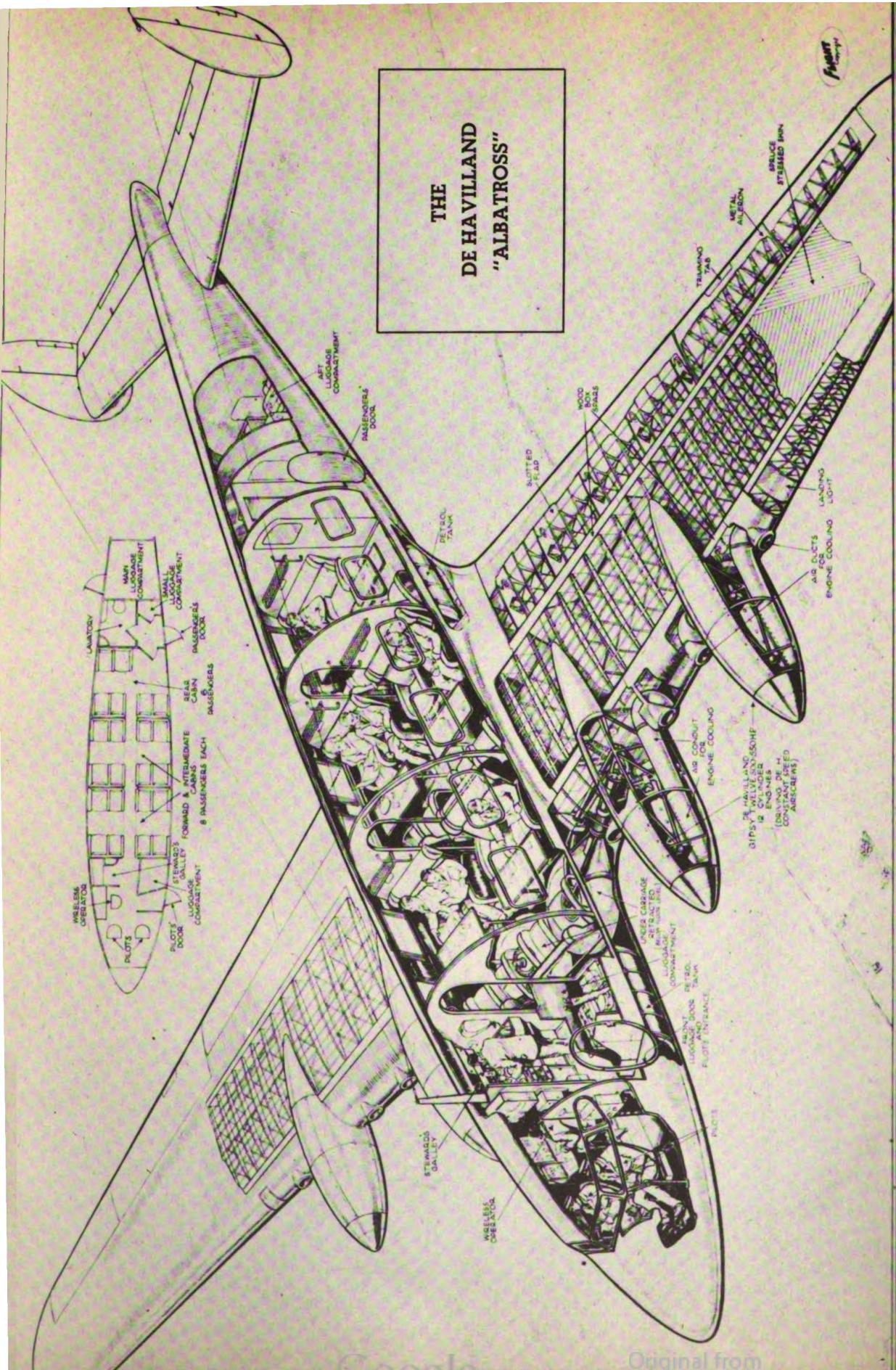
THE DE HAVILLAND "FLAMINGO" CRUISING WITH ONE ENGINE

The DeHavilland "Flamingo" D.H. 95, a twin-engine, all-metal high-wing monoplane. Accommodates 20 passengers and a crew of two. Powered by two 930-hp. Bristol Perseus XVI engines. It has a top speed of 239 m.p.h. and a cruising speed of 200 m.p.h. at 10,000 feet, service ceiling 20,900 feet, and cruising range 1,300 miles. The ship has a span of 70 feet and an overall length of 51 feet, 10 inches,

height 15 feet, 10 inches, gross weight 17,000 pounds, carries a payload of 13,200 pounds.

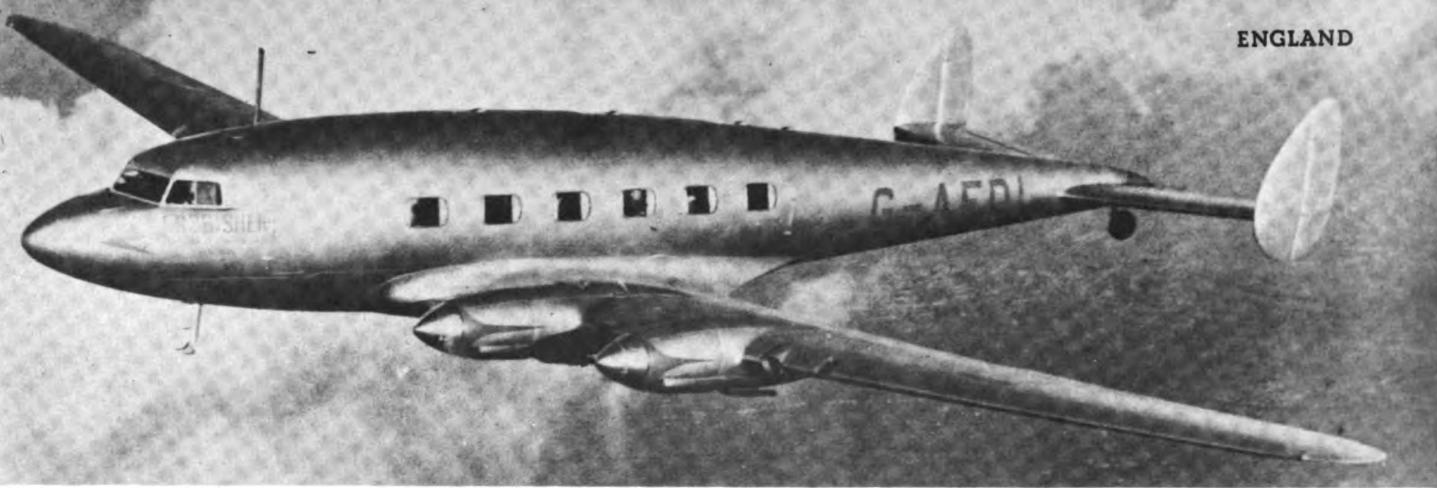


Interior of the "Flamingo"



## CUTAWAY DIAGRAM AND FLOOR PLAN OF THE DE HAVILLAND "ALBATROSS"

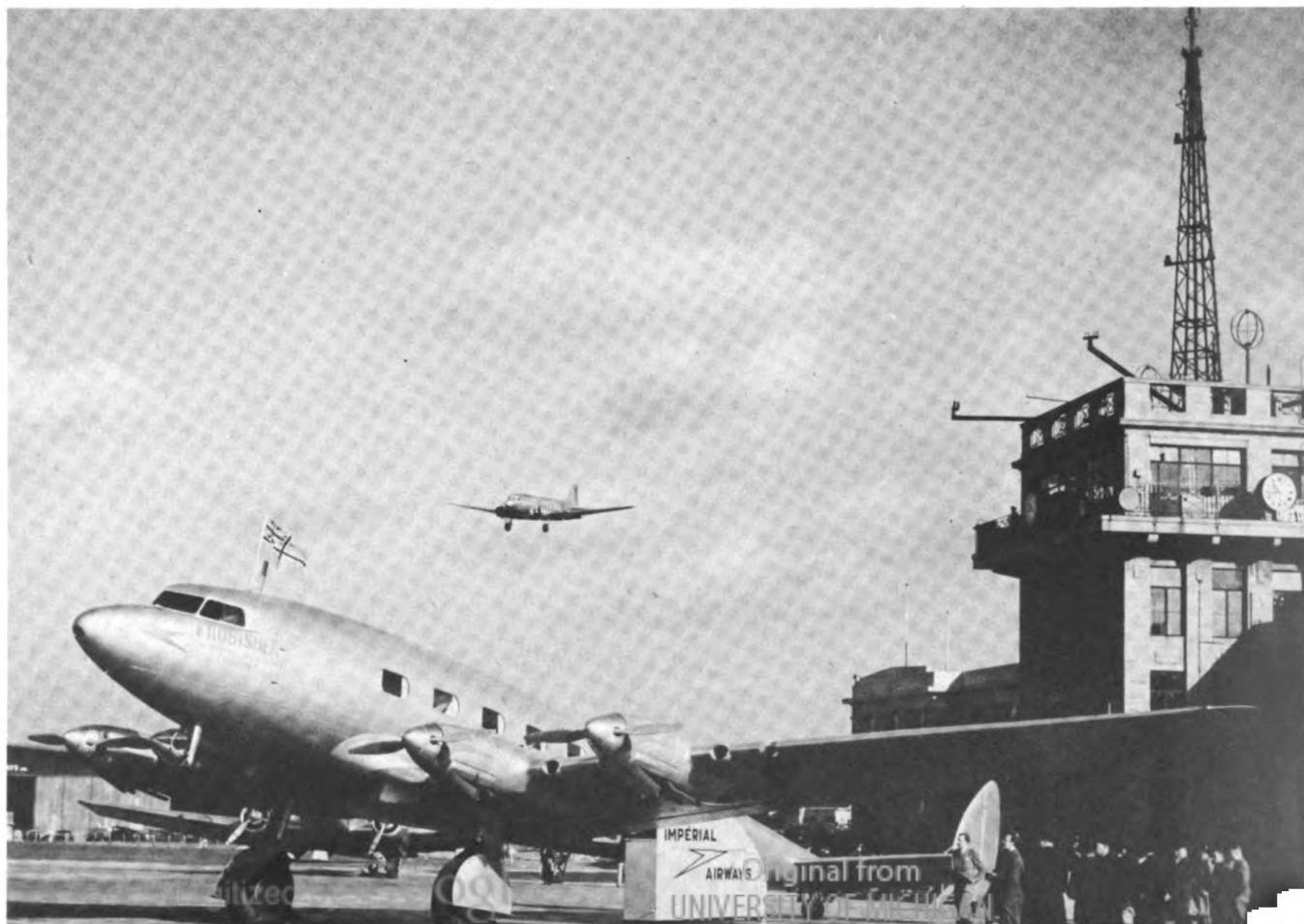
FROM "FLIGHT" London



THE DE HAVILLAND D.H. 91 "ALBATROSS" IN FLIGHT

The DeHavilland D.H. 91 "Albatross," the largest all-plywood plane in service. This ship carries 22 passengers by day and sleeps 12 by night. It is a low-wing monoplane with a span of 105 feet, length 71 feet, 6 inches overall. Powered by four

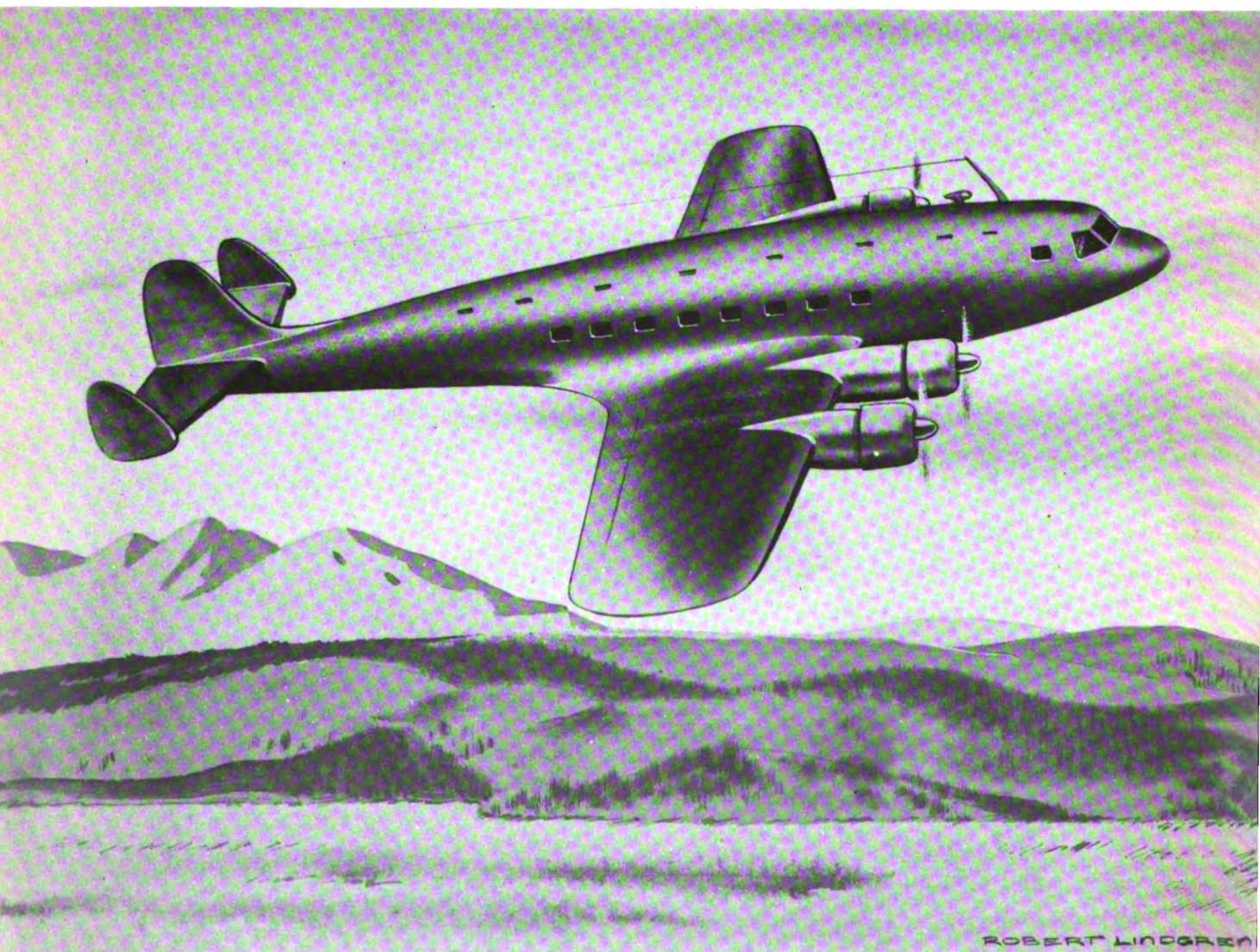
"Gypsy Twelve" Inverted V-Type engines of 525 hp. It has a cruising speed of 210 m.p.h., and a cruising range of over 1,000 miles. The service ceiling is 17,900 feet, gross weight 29,500 pounds, and carries a payload of 4,188 pounds.

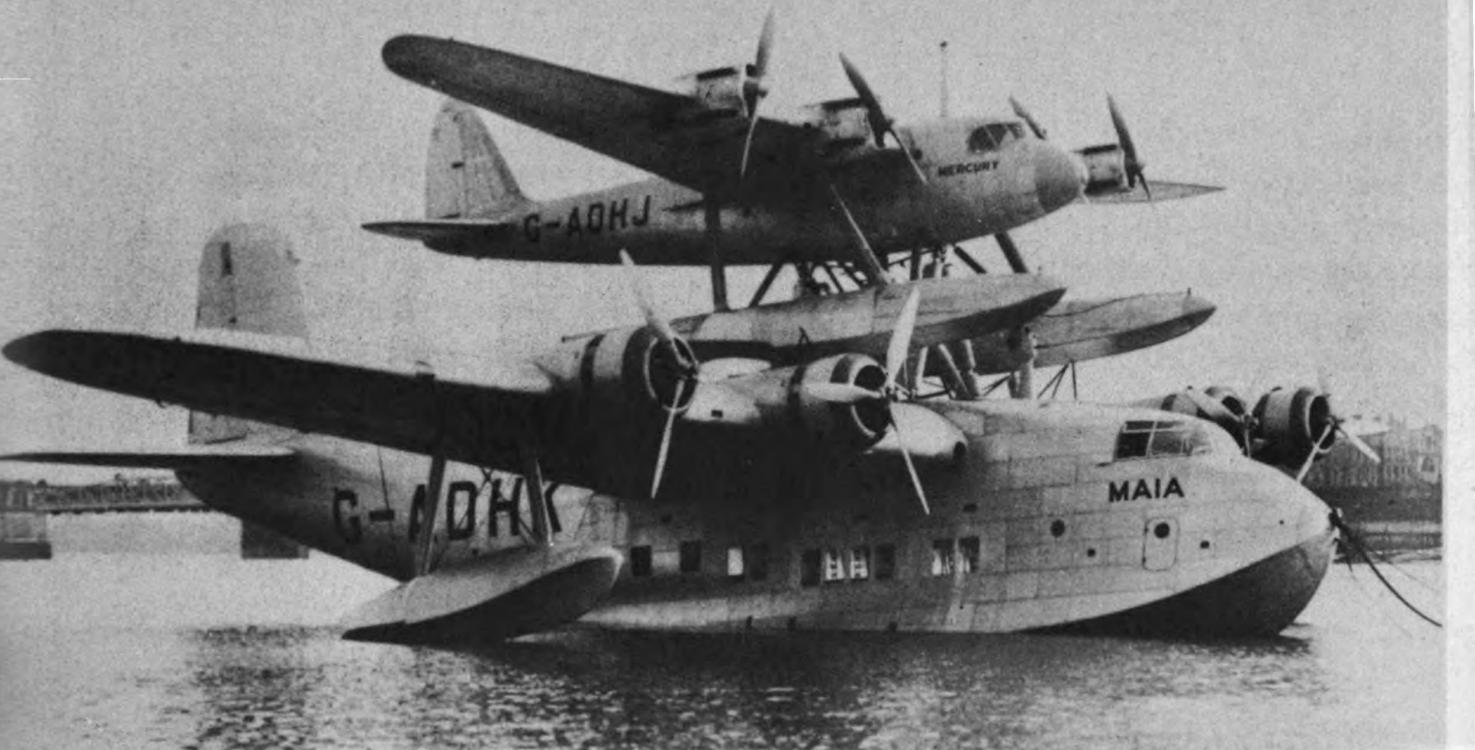


The "Fairey" F.C. 1, a four engine all-metal low-wing monoplane, with pressurized cabin for operation at 10,000 feet. This 30 passenger transport is similar in appearance to the Lockheed "Constellation." Powered by four 1,065-hp. Bristol "Taurus" engines, with a top speed of 275

m.p.h. and a cruising speed of 220 m.p.h. at 10,000 feet. This plane has a range of 1,500 miles. One of the unique features are the auxiliary wings which lower from wells in the main wing to give greater surface for lifting during take-off and landings.

THE "FAIREY" F.C. 1





THE MAYO COMPOSITE AIRCRAFT SHOWING BOTH COMPONENTS

The Mayo composite aircraft, a unique "pick-a-back" design to reduce wing loading of heavily loaded (upper-seaplane) aircraft in take-off. The top seaplane is loaded to capacity and mounted above a lightly loaded flying boat, which is capable of take-off, at a predetermined altitude. When the upper component has an excess of lift, the two planes are separated.

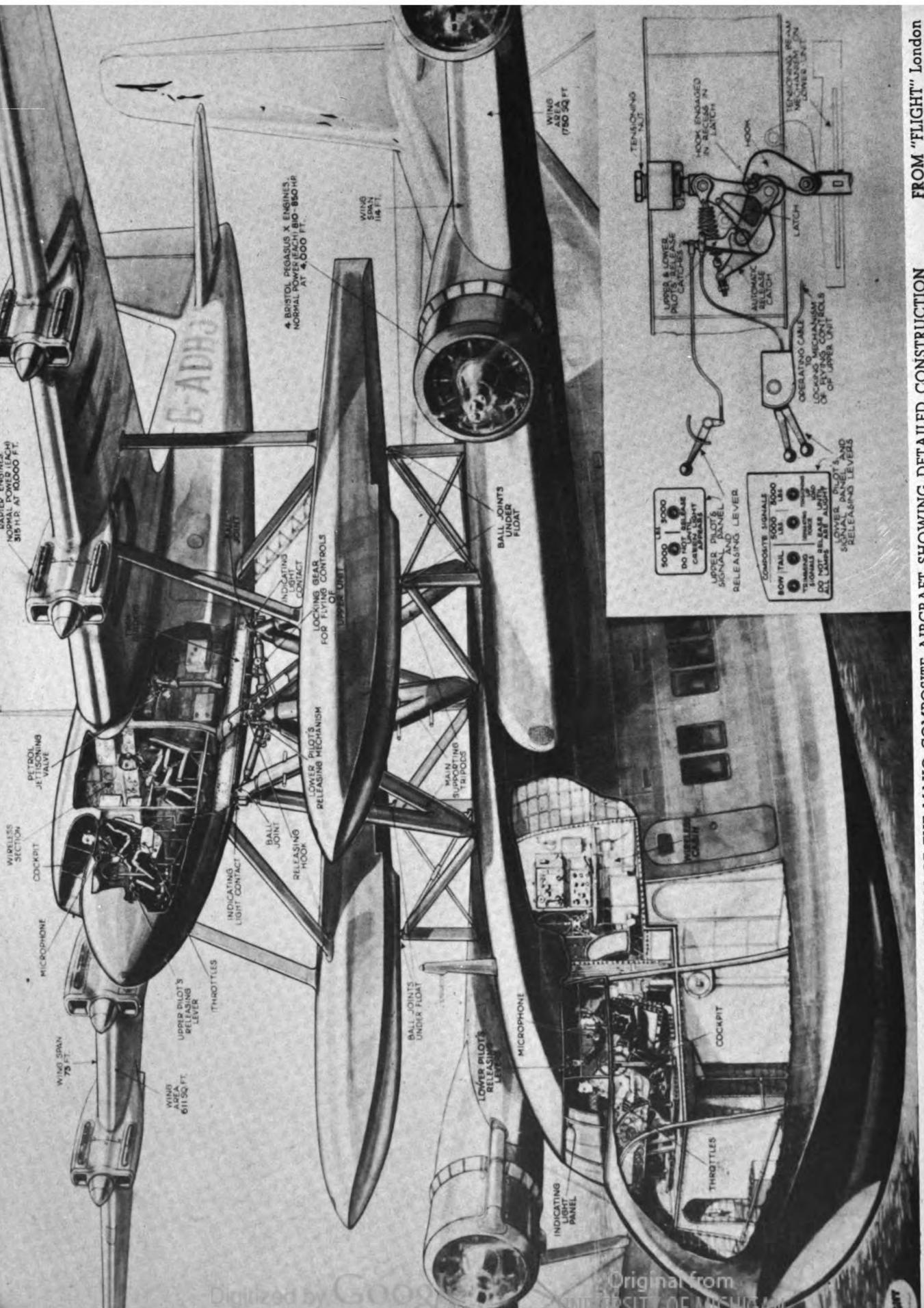
The upper aircraft is a high-wing twin float seaplane, powered by four 395-hp. Napier-Halford "Rapier" IV engines. The maximum speed is 215 m.p.h., and the cruising range is 3,900 miles. It has a wing span of 73 feet, 11 inches, a length of 50 feet, 11 inches and a height of 20 feet, 3 inches. The plane's empty weight is

10,160 pounds, and the gross weight is 20,800 pounds.

The lower flying boat is substantially the same as the Short "Empire" class "C" on page 71. Diagram of break-away controls on the following page.

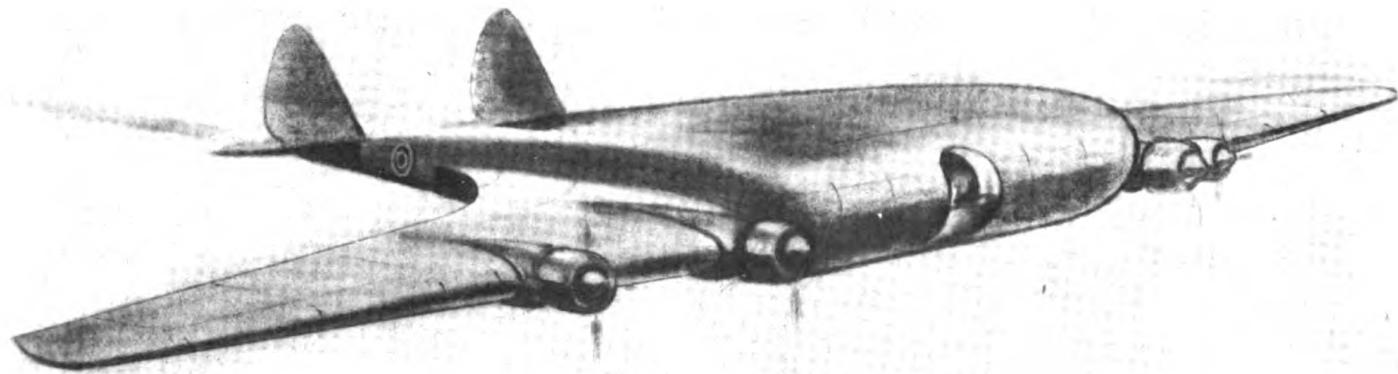


MAYO COMPOSITE AIRCRAFT AT BREAK-AWAY



FROM "FLIGHT" London

CUTAWAY DIAGRAM OF THE MAYO COMPOSITE AIRCRAFT SHOWING DETAILED CONSTRUCTION



The Percival air freighter—an artist's conception of the four engine "lifting fuselage" transport, envisioned by A. A.

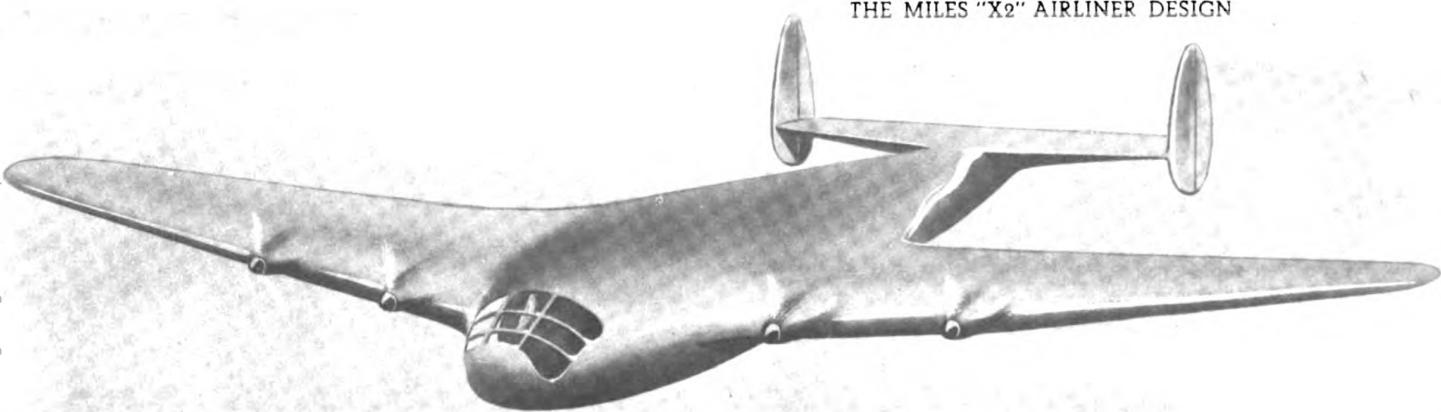
Bage, chief designer of Percival Aircraft Ltd. This design is still in the "drawing board" stage.



The Phillips and Powis, Miles "X2" airliner. This design by F. G. Miles was well-advanced in 1938, but was only recently announced by the British Air Ministry. It has a wing span of 150 feet and a length of 110 feet. Powered by eight Rolls-Royce Merlin engines mounted in pairs. Maximum speed is 425 m.p.h. at 16,000 feet, cruising speed will be about 350 m.p.h.,

and will have a range of 3,450 miles. The plane of all metal construction will accommodate 50 passengers and a crew of five. It has a freight capacity of 16,430 pounds. Weight loaded, 130,000 pounds. The wing merges into the fuselage, in this unusual design, which is a cross between an all-wing and the standard type fuselage.

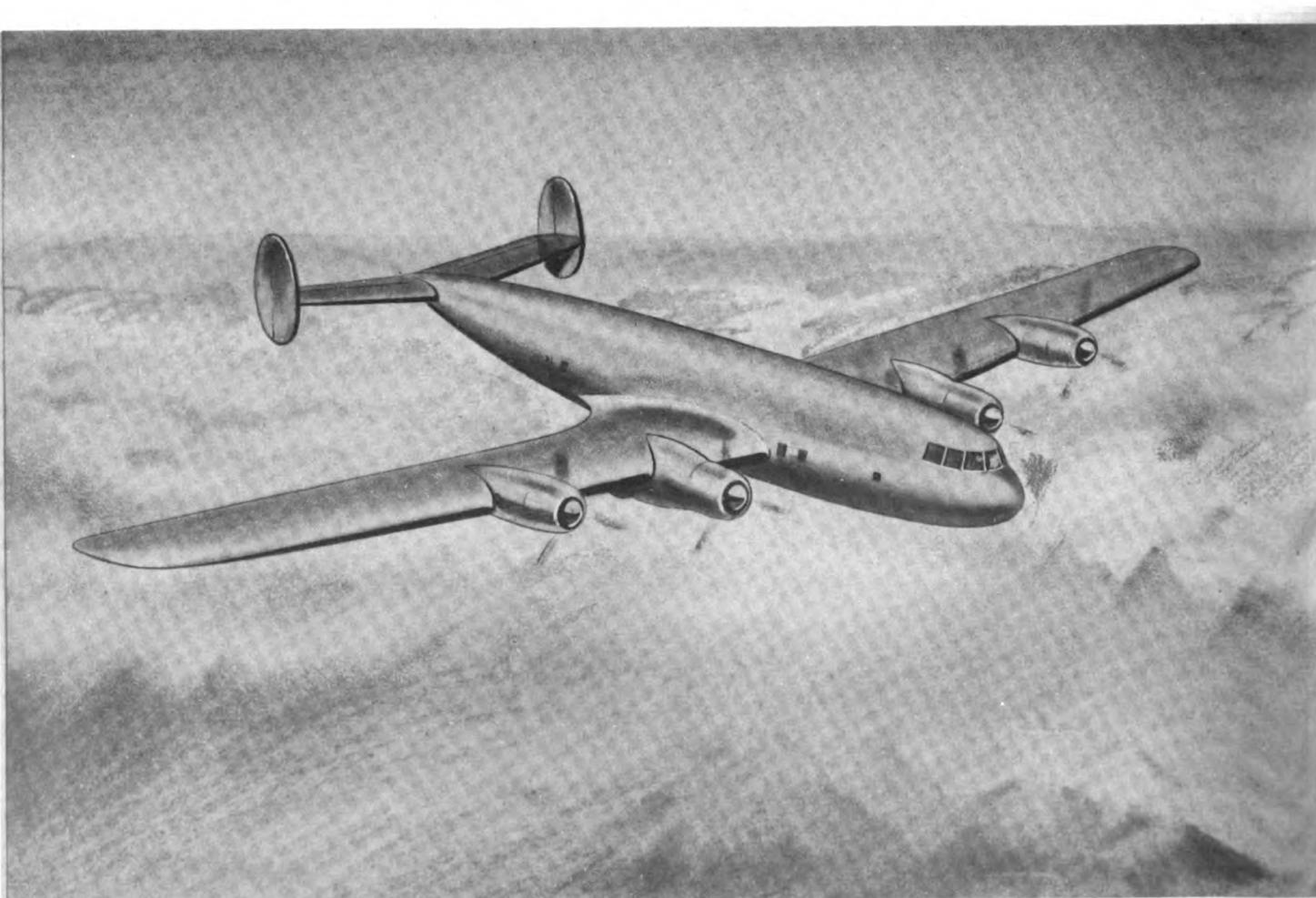
THE MILES "X2" AIRLINER DESIGN



The Short 14/38, a 16 passenger, seven crew airliner Type-A, built around four 1,380-hp. Bristol "Hercules" sleeve valve engines. The Type "A" has a speed of 246 m.p.h. at 10,000 feet and a cruising range of 3,000 miles. This mid-wing monoplane of all metal construction, has a wing span of 127 feet, 6 inches, an overall length of 89 feet, and a height of 20

feet. It has an empty weight of 34,900 pounds and a gross weight of 71,000 pounds.

The Short 14/38 Type-B, designed to operate above 20,000 feet at a top speed of 330 m.p.h., is substantially the same as Type-A except for a pressurized cabin which provides relative pressure of 8,000 feet.



THE SHORT 14/38 AIRLINER



THE SHORT "EMPIRE C" CLASS FLYING BOAT READY FOR TAKE-OFF

The Short "Empire" modified "C" class flying boat, accommodates 15 to 24 passengers and a crew of five. Powered by four Bristol "Perseus XIIC" engines of 800 hp. each. This high-wing monoplane has a span of 114 feet and a length of 88 feet. The height (to top of fin) is 31 feet 9 $\frac{3}{4}$  inches, weight empty, 27,825 pounds, and weight loaded 48,000 pounds. It has a top speed of 200 m.p.h., a cruising speed

of 164 m.p.h. and a cruising range of 1,870 miles, (refuelled in the air) 3,400 miles. This ship has a double-deck two-step boat hull.

The "C" class is similar to the modified "C" class with the exception of the engines which are Bristol "Pegasus" XC's. The structure has been strengthened for the modified "C" class to permit a greater loaded weight.



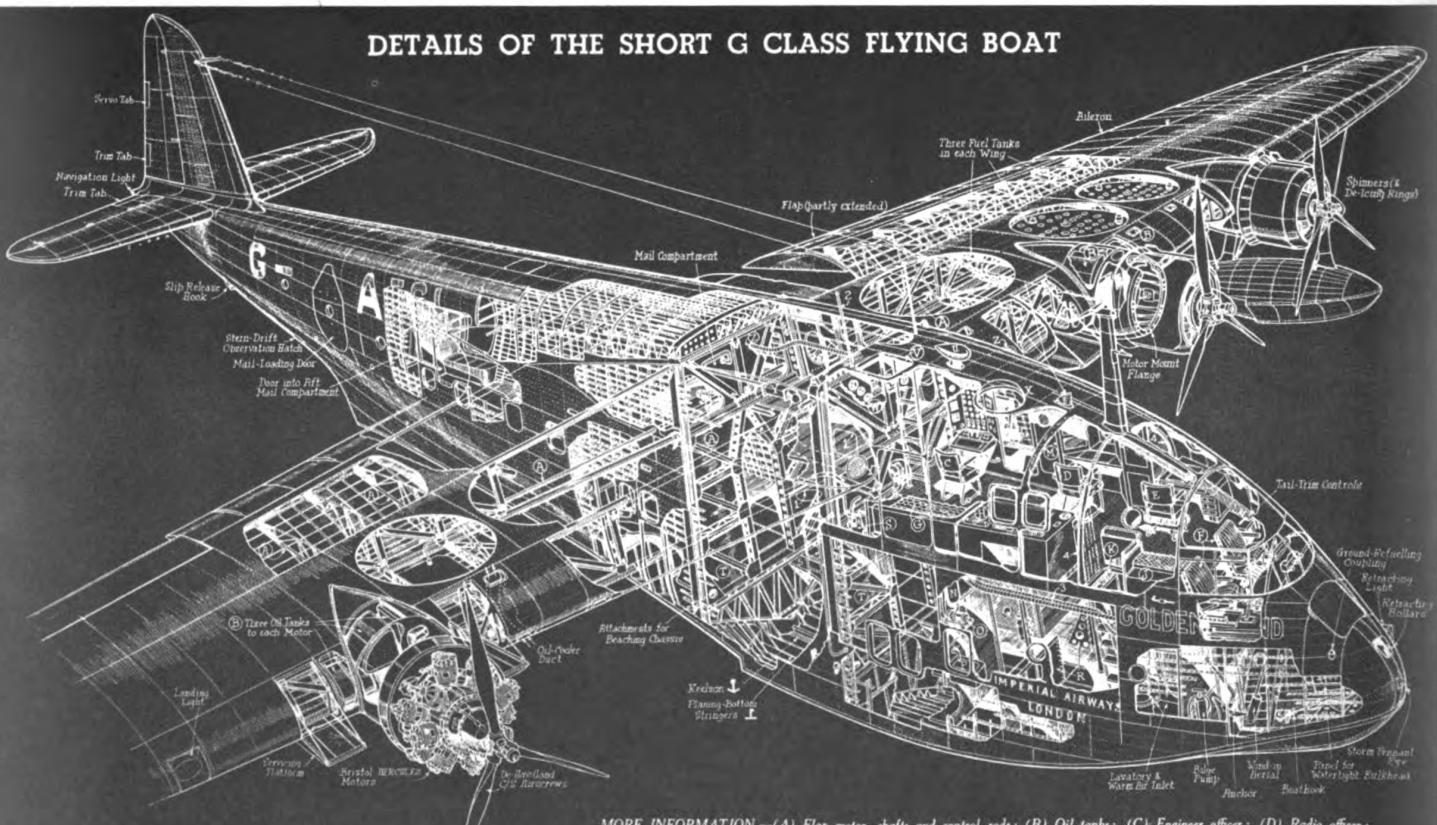


THE SHORT "G" EMPIRE FLYING BOAT

The Short "G" class flying boat, development of the "Empire" type in service with the British Overseas Airways, accommodates from 12 to 24 passengers with a crew of five. Powered by four Bristol "Hercules IV" double-row radial sleeve-valve, air-cooled engines of 1,375 hp. each. It has a wing span of 134 feet, 4 inches, length 103 feet, 2 inches, and height (to

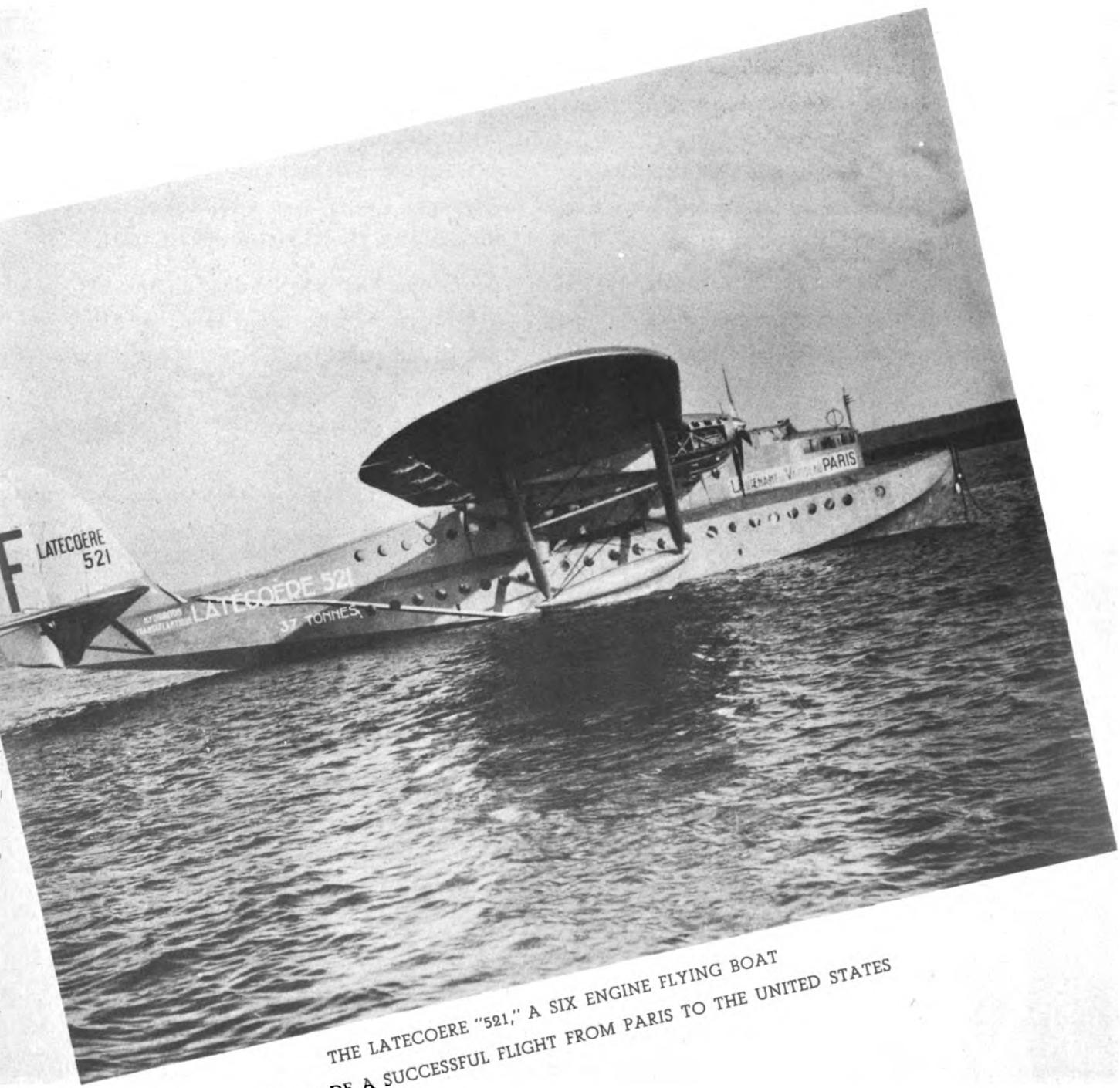
top of fin) 37 feet, 7 inches. The weight empty is 37,700 pounds, payload and crew, 5,250 pounds, and weight loaded is 74,500 pounds. It has a top speed of 214 m.p.h., a cruising speed of 185 m.p.h., and a cruising range of 3,200 miles. The hull is divided into two decks, and has the same general construction as "C" class except for the sharp edge rear step.

## DETAILS OF THE SHORT G CLASS FLYING BOAT

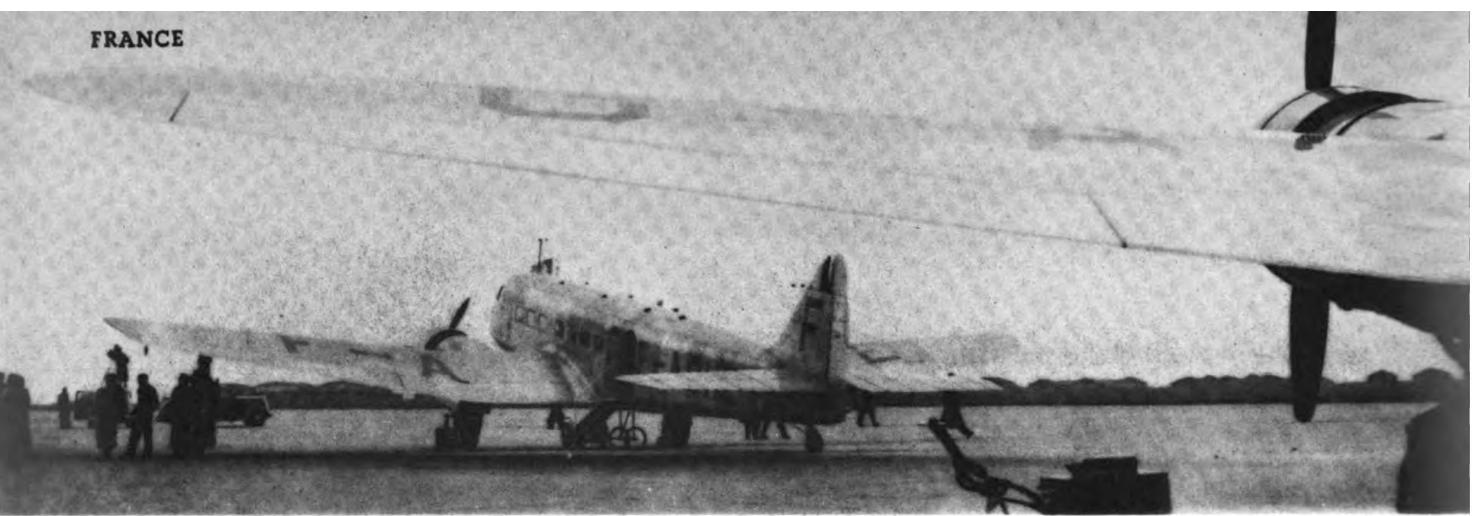


MORE INFORMATION.—(A) Flap motor, shafts and control rods; (B) Oil tanks; (C) Engineer officer; (D) Radio officer; (E) Captain; (F) 1st and 2nd pilots; (G) Rest couch; (H) Desk (navigating officer); (I) Seal-box; (K) Hatch and stayway from lower deck; (L) Battery and connections in mail compartment; (M) Door into book compartment; (N) Water tank; (O) Pump and motor (heating system); (P) Sink; (Q) Mail compartment; (R) Watertight bulkhead (with detachable centre panel); (S) Stop valves (ground refuelling to tanks); (T) Main frames; (U) D/F loops; (V) Engineer's hatch and ladder; (W) Fuel controls; (X) Celestial observation dome; (Y) Air inlet in leading edge and heater (warm-air system); (Z) Air inlet in leading edge (cooling system); (1) Driftsight hole in underside of wing and hatch; (2) Pennant masts; (3) Warm air mains; (4) Curtains in case.

**FRENCH  
TRANSPORT  
DESIGNS**



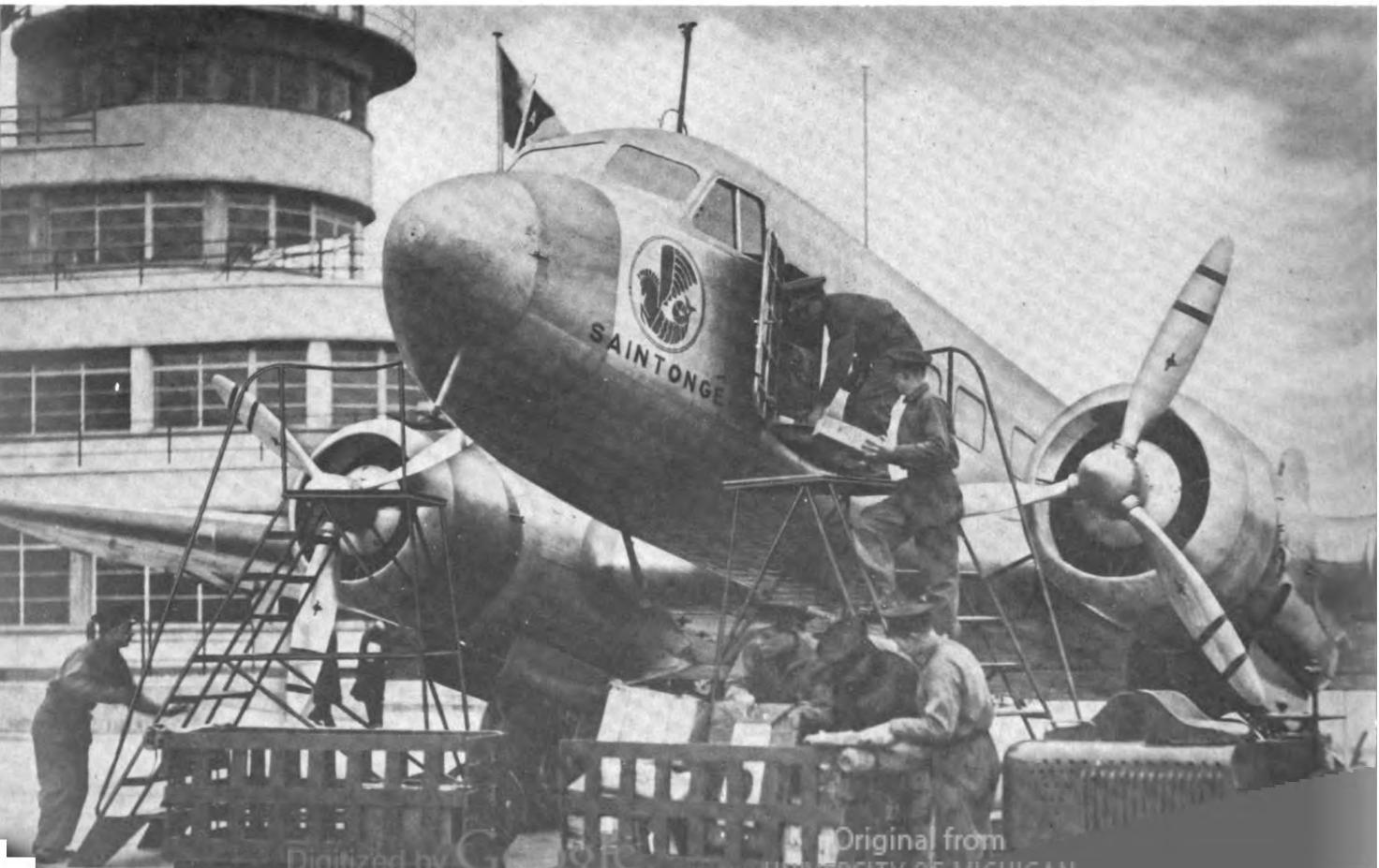
THE LATECOÈRE "521," A SIX ENGINE FLYING BOAT  
WHICH MADE A SUCCESSFUL FLIGHT FROM PARIS TO THE UNITED STATES



THE BLOCH "220"

The Bloch "220," a 16 passenger, four-crew low-wing monoplane, similar in appearance to the Douglas DC-2. It has a wing span of 74 feet, 9 inches, a length of 64 feet, 3 inches, and a height of 12 feet, 9 inches. The "220" is powered by

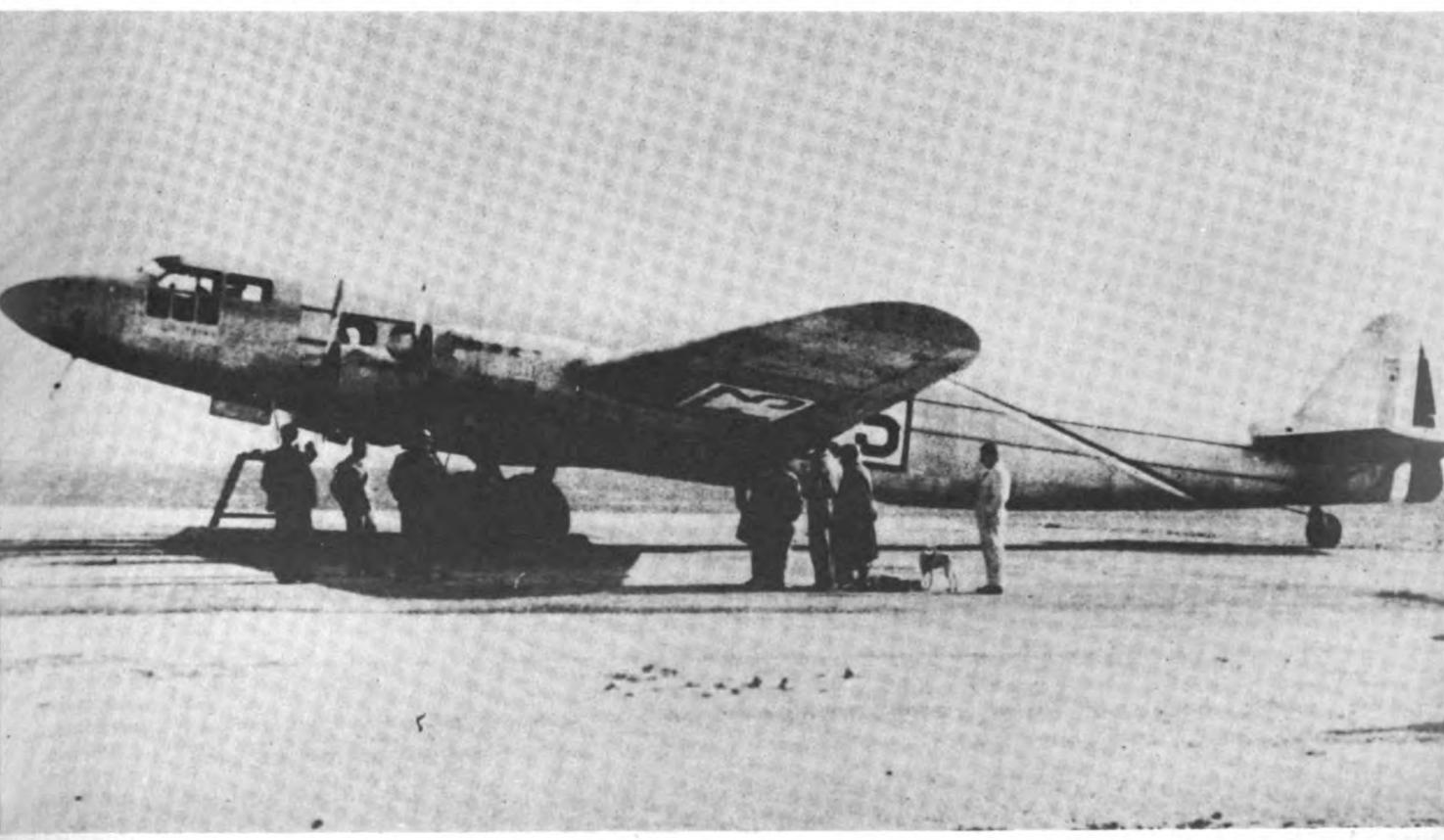
two Gnome-Rhone 14N16 or 17 engines of 918 hp. each, with a top speed of 220 m.p.h. and a cruising speed of 186 m.p.h. The weight empty is 14,330 pounds, useful load 6,600 pounds, and the loaded weight is 20,940 pounds.



The Bloch "160" carries 12 passengers and a crew of four. This low-wing monoplane is of all-metal construction. It has a wing span of 89 feet, 10 inches, the overall length 86 feet, 11 inches, and the height is 16 feet. The "160" is powered by four 720-hp. Hispano-Suiza 12 Xirs 1 engines,

with a top speed of 221 m.p.h., a cruising speed of 193 m.p.h. at 6,890 feet, and a cruising range of 1,055 miles. The service ceiling is 19,025 feet, weight empty 21,560 pounds, useful load 11,352 pounds, and gross weight 32,912 pounds.

THE BLOCH "160" SHOWN WITH THE CREW AFTER ITS SUCCESSFUL TRIAL RUN IN MARSEILLE



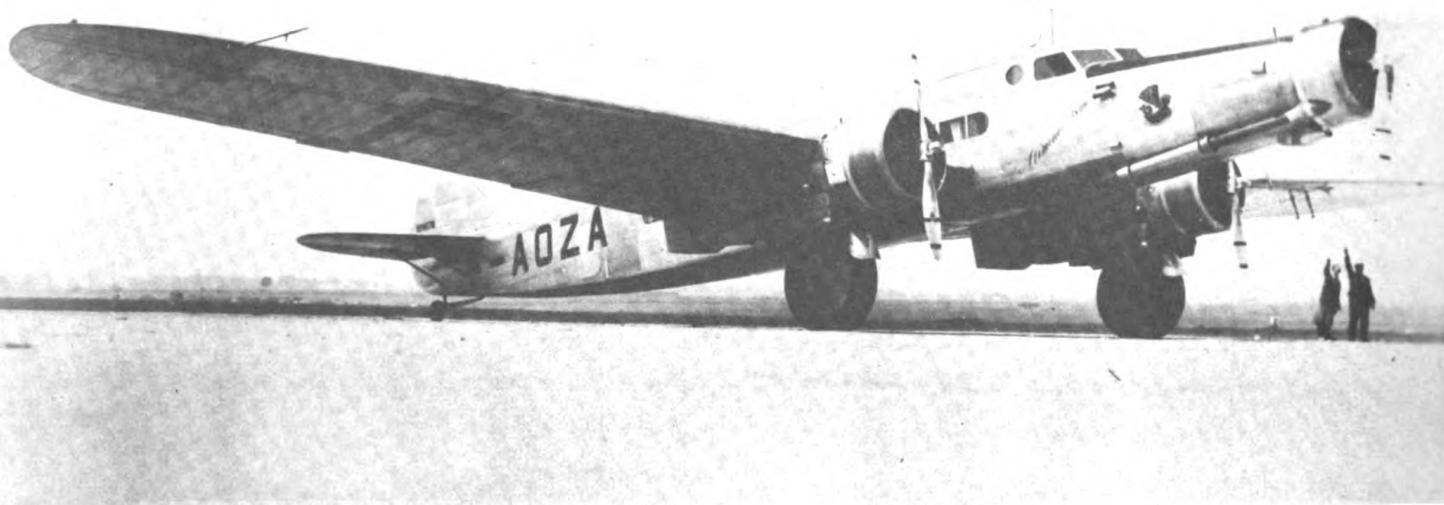
The Dewoitine "D.338" three engine all-metal transport, carries 18 to 24 passengers and a crew of three. This low-wing monoplane has a wing span of 96 feet, 4 inches, the overall length is 72 feet, 7 inches and the height, 18 feet, 3 inches.

The "D.338" is powered by three Hispano-Suiza 9V16 engines of 650 hp. each, with a top speed of 195 m.p.h., a cruising speed of 174 m.p.h., and a cruising range of 550 miles. It has a service ceiling of 16,072

feet, absolute ceiling 17,220 feet, empty weight is 14,859 pounds, and gross weight 24,420 pounds. The transport pictured shows two blade propellers, later version has three blade Hispano-Hamilton propellers.

The Dewoitine "D.342" carries 27 to 30 passengers and is generally similar to the "D.338." It has three Gnome-Rhone 14 N. 16 engines of 915 hp. with a maximum speed of 242 m.p.h.

THE DEWOITINE "D.338"

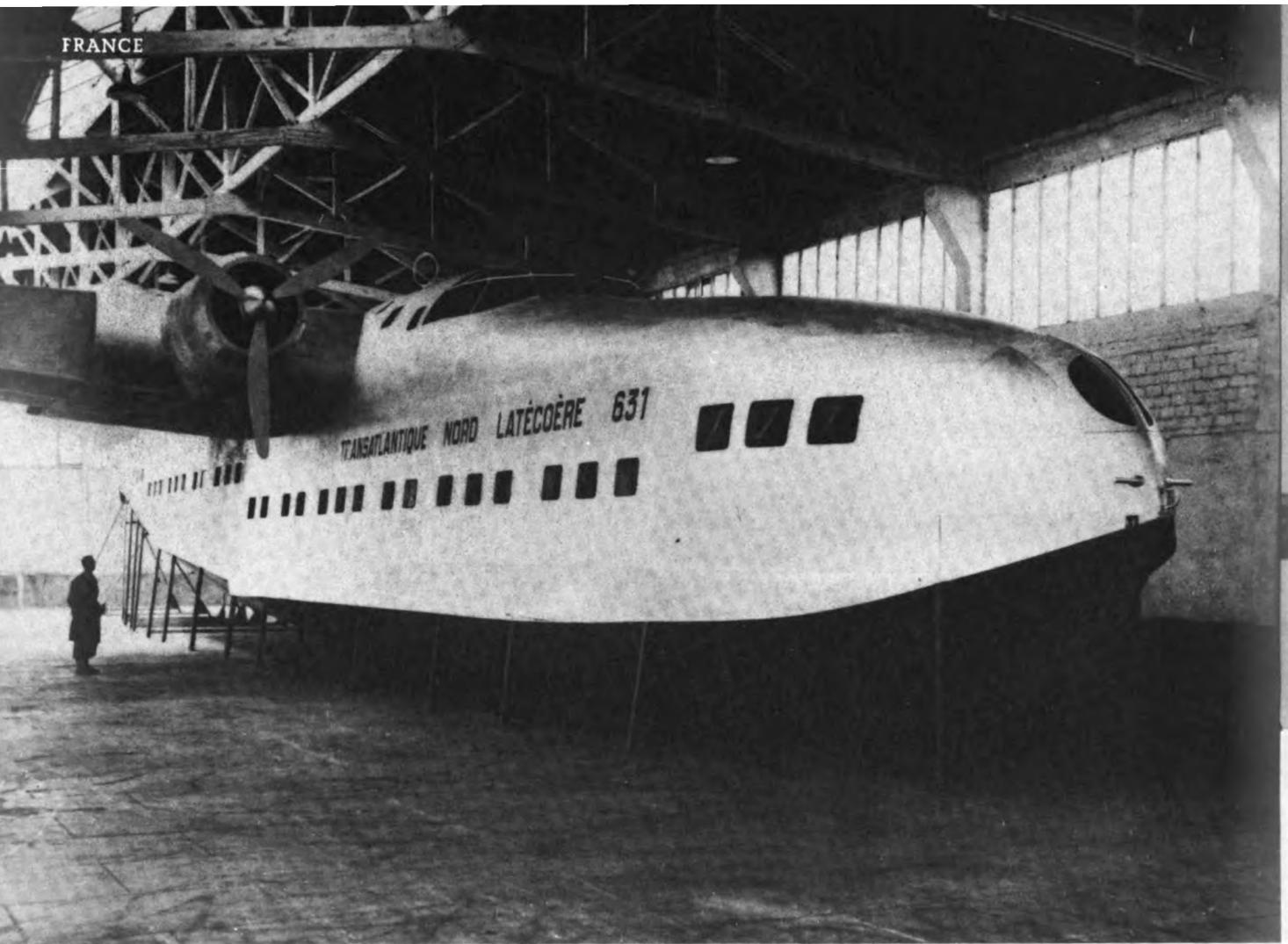




THE FARMAN "2234" HIGH ALTITUDE TRANSPORT

The Farman "2234" high altitude transport. This 16 place, 25 ton, high-wing monoplane made a sub-stratosphere flight across the South Atlantic from Dakar to Natal, flying at an average height of 24,000 feet. It has a wing span of 110 feet, a length of 77 feet, 1 inch, and

a height of 19 feet, 4 inches. The plane's empty weight is 26,450 pounds, useful load, 26,450 pounds. This ship is powered by four Hispano-Suiza 12Y-39 liquid-cooled engines mounted in tandem pairs. It has a cruising speed of over 200 m.p.h. and a service ceiling of 32,000 feet.



MOCK-UP OF THE LATECOERE 631 TRANS-ATLANTIC FLYING BOAT

The Latécoère 631, a 40 passenger long-range flying boat, with a two-deck all-metal boat hull. The lower deck contains compartments accommodating 20 passengers; there is also a bar and center salon. The upper deck provides for pilots, navigator, radio operator, and sleeping accommodations for the crew of eight. The "631" is powered by six 1,500-hp. Gnome-

Rhone P.18 engines, with a top speed of 261 m.p.h., a cruising speed of 217 m.p.h., and a maximum range of 3,725 miles. The empty weight is 53,240 pounds, the maximum weight 145,200 pounds. This high-wing flying boat has a wing span of 186 feet, 11 inches, a length of 140 feet, 10 inches, and a height of 33 feet, 2 inches.

The Le O H-47 is a 22 passenger flying boat. The hull has a two-step "V" bottom of metal construction. It is a high wing monoplane with wing mounted on a pylon. The engines are mounted in tandem pairs on top of the wing. The wing span is 104 feet with an overall length of 68 feet, 5 inches and a height of 32 feet, 7 inches. This transport is powered by four

Hispano-Suiza 12Y-drs engines of 860 hp. each, giving it a maximum speed of 223 m.p.h., a cruising speed of 180 m.p.h., an absolute ceiling of 22,960 feet and a cruising range of 2,485 miles. The empty weight is 22,154 pounds, the payload is 2,304 pounds and the loaded weight is 39,380 pounds.

THE LE O H-47 BEING WHEELED OUT FOR ITS FIRST WATER TESTS





The Le O H-24-6, a 24 passenger, four crew, high-wing flying boat, which was to be used for Mediterranean service. The hull is of metal construction with a two-step "V" bottom, and the wing is of wood construction covered with plywood.

It has a wing span of 104 feet, a length

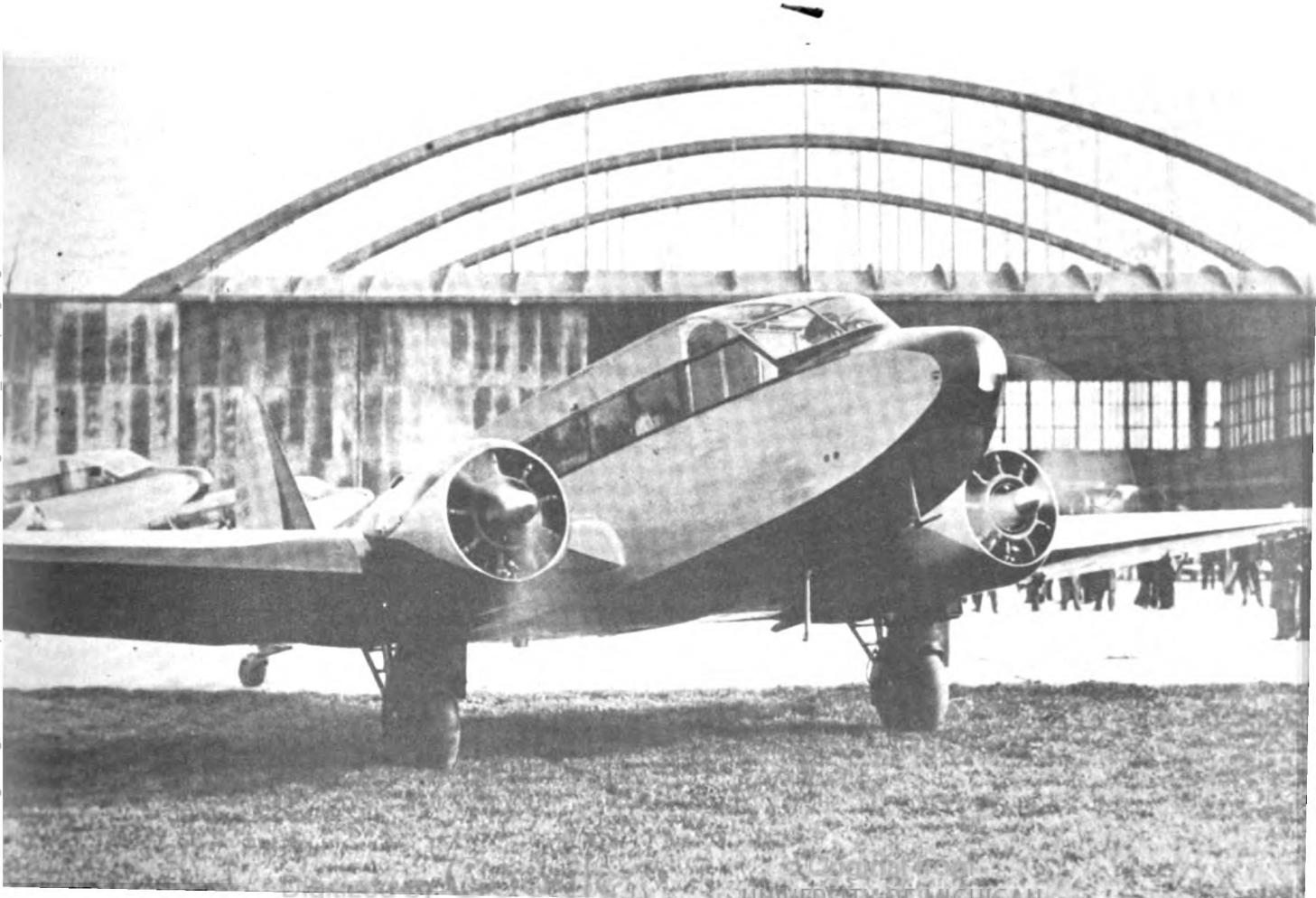
of 69 feet, 5 inches, and a height of 69 feet, 5 inches. The weight empty is 21,560 pounds, useful load is 11,352 pounds, and the gross weight is 39,912 pounds. The "H-24-6" is powered by four Hispano-Suiza 12 Xirs engines of 720 hp. each.

The Potez "56," a twin engine, eight passenger transport, is well adapted to the short lines of the Continent. Its structure is of wood with plywood covering, and is powered by two 185-hp. Potez 9 AB engines, giving it a top speed of 174 m.p.h. and a maximum range of 930 miles, with

an absolute ceiling of 19,680 feet.

The "56" has a wing span of 52 feet, 6 inches, an overall length of 38 feet, 10 inches, and a height of 10 feet, 2 inches. The weight empty is 3,360 pounds, and the weight loaded is 6,098 pounds.

THE POTEZ "56" WARMING UP FOR A SCHEDULED PASSENGER FLIGHT

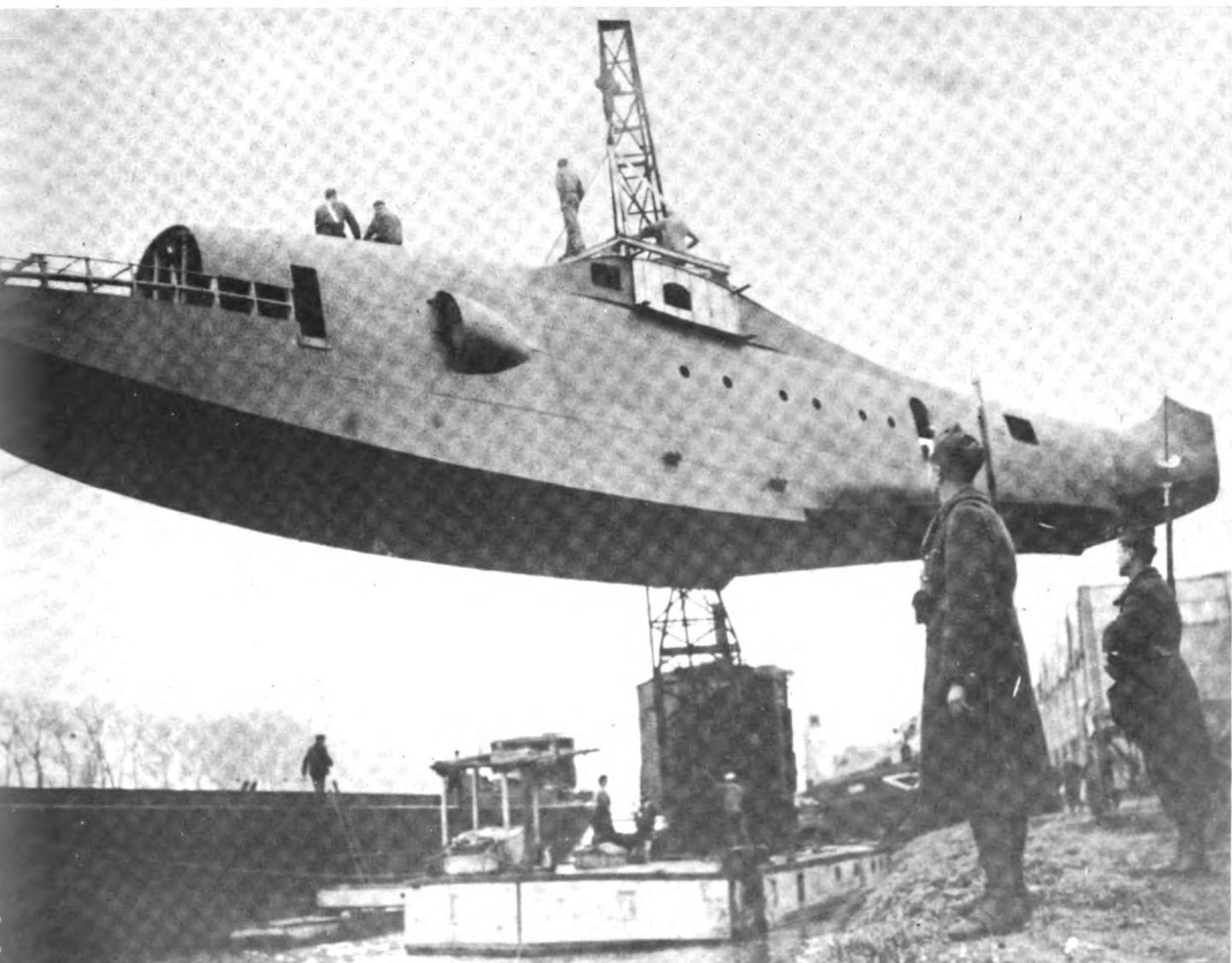


The Potez "662," a four engine, 12 passenger transport. This low-wing monoplane is of all-metal construction with twin fins and rudders mounted to the top of the fuselage. The "662" is powered by four 680-hp. Gnome-Rhone "14 Mars" engines, with a top speed of 292 m.p.h., a

cruising speed of 249 m.p.h., and a cruising range of 620 miles. The plane's empty weight is 12,100 pounds, gross weight 18,436 pounds. It has a wing span of 73 feet, 9 inches, a length of 54 feet, 5 inches, and a height of 14 feet, 5 inches.

THE POTEZ "662" EXPRESS PASSENGER TRANSPORT

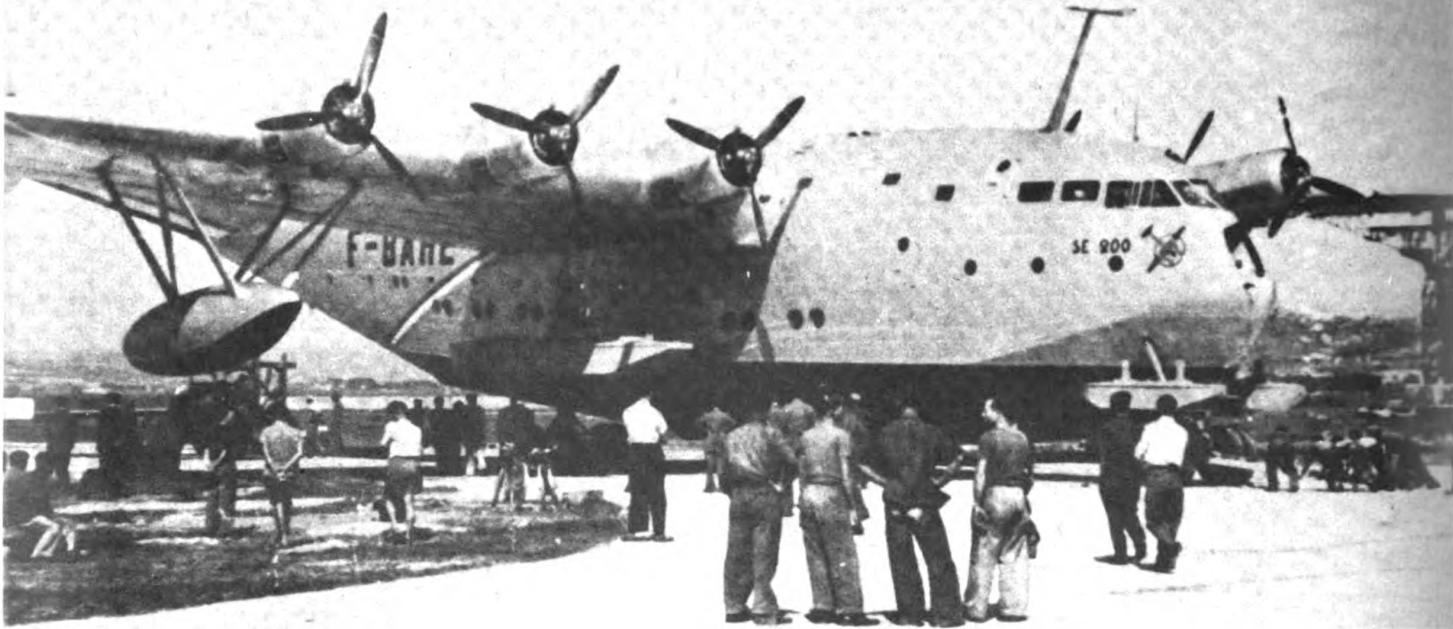




THE HULL OF THE POTEZ-CAMS "161" BEING HOISTED ABOARD  
A BARGE FOR SHIPMENT TO A FINAL ASSEMBLY PLANT

The Potez-Cams "161," a six engine flying boat. This high-wing monoplane has a wing span of 150 feet, 11 inches, and a two-step boat hull which is 105 feet, 6 inches in length. The "161" weighs 42

tons and was designed to carry twenty passengers on the Atlantic route from France to the United States. It is powered by six 950-hp. Hispano-Suiza 12 Ydr 52 engines.



S.E. "220" BEING WHEELED FROM ITS CONSTRUCTION BASE AT  
MARGNANNE, WHERE THE FIRST BASE TESTS WERE HELD

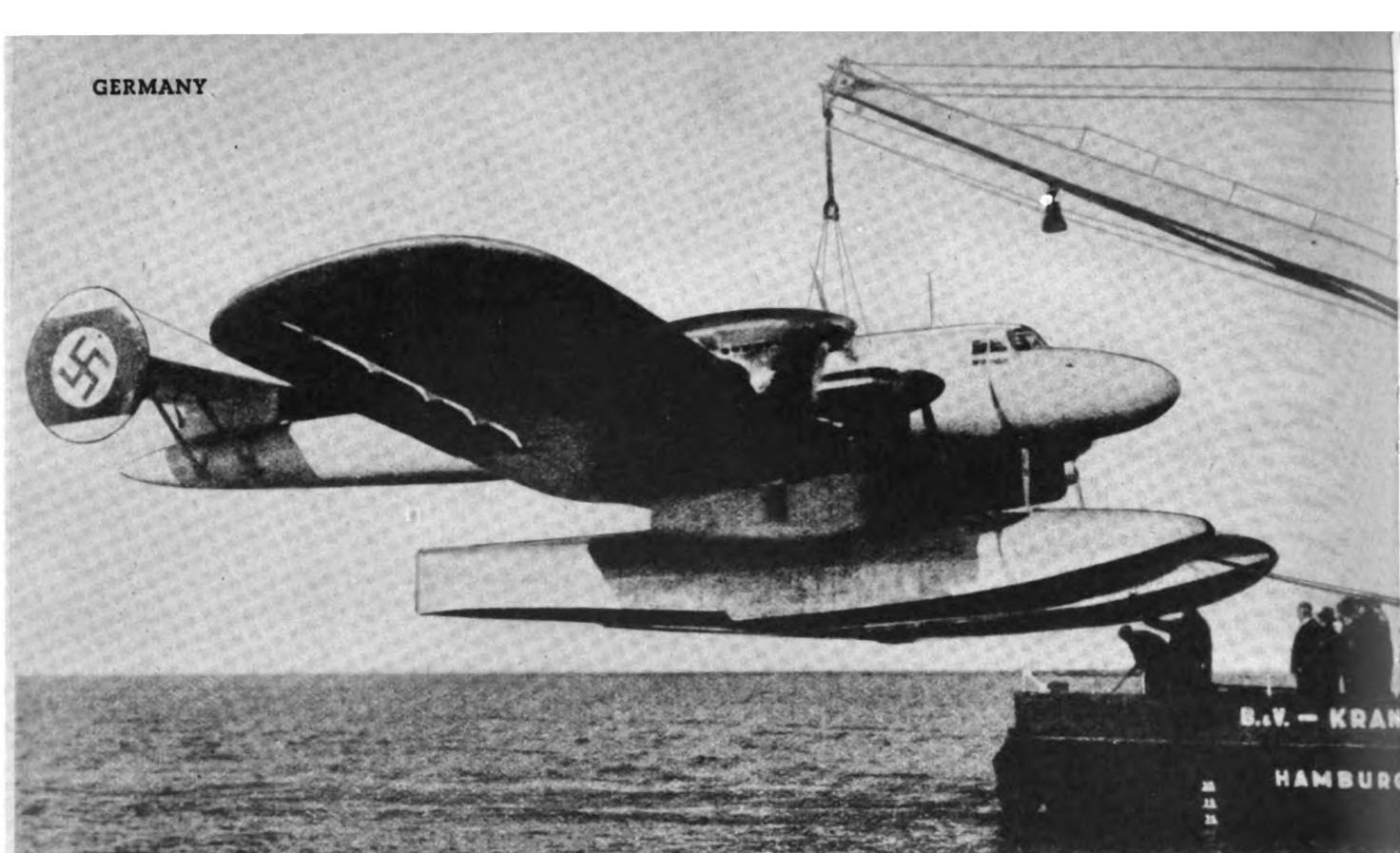
The S.E. "220" 63 ton, six engine Trans-Atlantic flying boat, accommodates 40 passengers and a crew of eight. It is a high-wing monoplane of metal construction, with a two-deck hull, capable of carrying 13,200 pounds of freight. The S.E.

"200" has a wing span of 171 feet, 3 inches, a length of 131 feet, 8 inches, and a height of 31 feet, 11 inches. Its six radial air-cooled engines develop 9,600 hp. It has a maximum speed of 260 m.p.h., and a cruising range of 3,726 miles.

GERMAN  
TRANSPORT  
DESIGNS



Original from  
UNIVERSITY OF MICHIGAN



THE BV. 139-B BEING HOISTED FOR CATAPULTING

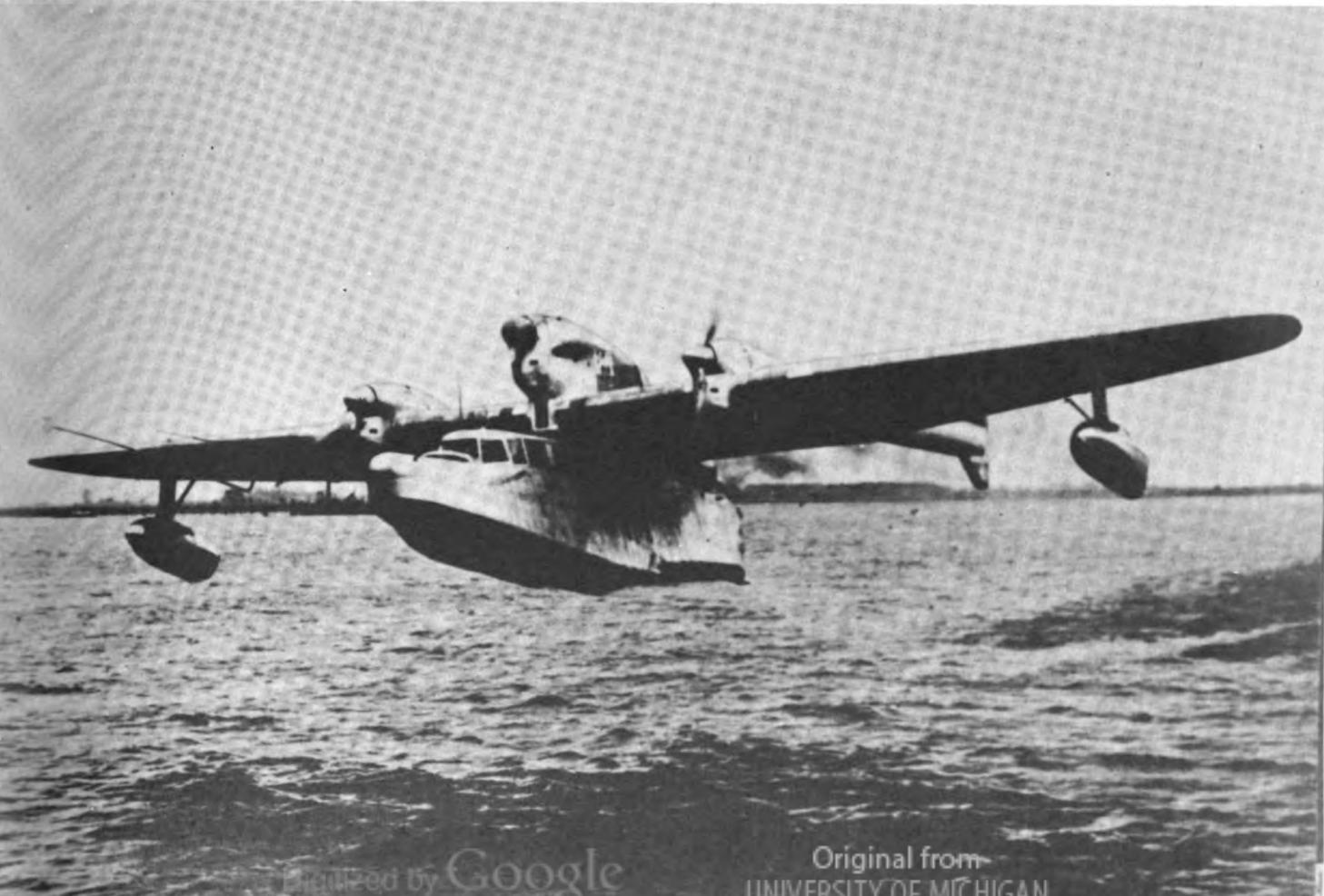
The Blohm and Voss BV. 139-B. Experimental flights by the Lufthansa across the North Atlantic were made in this four engine seaplane which was catapulted from the mother ship "Friesenland." This low-wing transport is powered by four Junkers "Jumo" liquid cooled Diesel engines of 600 hp. each, giving it a maximum speed of 202 m.p.h., a cruising

speed of 165 m.p.h. and a range of 3,230 miles. The "BV. 139-B" has a wing span of 96 feet, a length of 64 feet, 6 inches and it measures 14 feet, 7 inches in height. It has a service ceiling of 12,150 feet. Weight empty is 22,902 pounds, payload 1,056 pounds. Weight loaded with catapult starting 38,610 pounds.

The Blohm and Voss BV. 138 mail carrier, is a three engine long range flying boat, designed for catapult launching. The plane is of all metal construction with wings mounted directly on top of the hull. It has twin fins and rudders mounted on two tail booms. The empty weight is

17,820 pounds, and the gross weight is 26,180 pounds. The Bv. 138 is powered by three Junkers "Jumo" 205 engines of 510 hp. each, giving it a top speed of 171 m.p.h., a cruising speed of 146 m.p.h., and a range of 1,490 miles.

A BLOHM AND VOSS BV. 138 FLYING BOAT AT TAKE-OFF



The Blohm and Voss BV. 222 high-wing flying-boat designed for the Deutsche Lufthansa as a Trans-Atlantic transport, with a gross weight of 45 tons, powered by six B.M.W. radial air-cooled engines

of 1,000 hp. each. It has a maximum range in excess of 4,000 miles non-stop, and a long-range cruising speed of around 170 m.p.h. and a top speed of 199 m.p.h.

THE BLOHM AND VOSS BV. 222

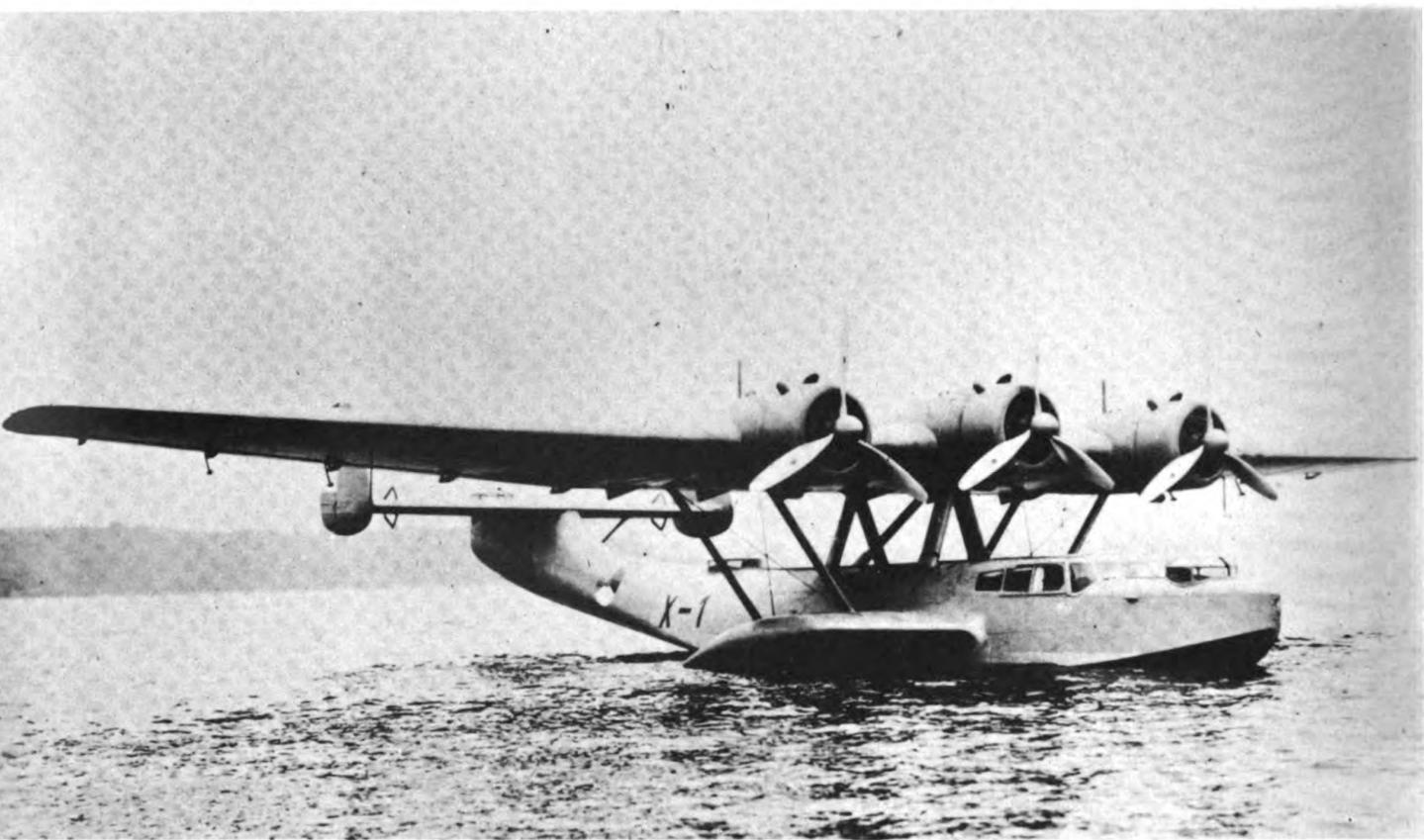




THE BV. 142 COMING IN FOR A LANDING

The Blohm and Voss BV. 142 is a four engine transport and land plane version of the BV. 139-B. It accommodates 30 passengers and a crew of four. Powered by four 880-hp. B.M.W. radial engines with

a top speed of 248 m.p.h. and a maximum range of 2,732 miles. It has a wing span of 96 feet, 9 inches and a length of 63 feet, 11 inches, height 15 feet, 6 inches. Weight loaded 35,640 pounds.



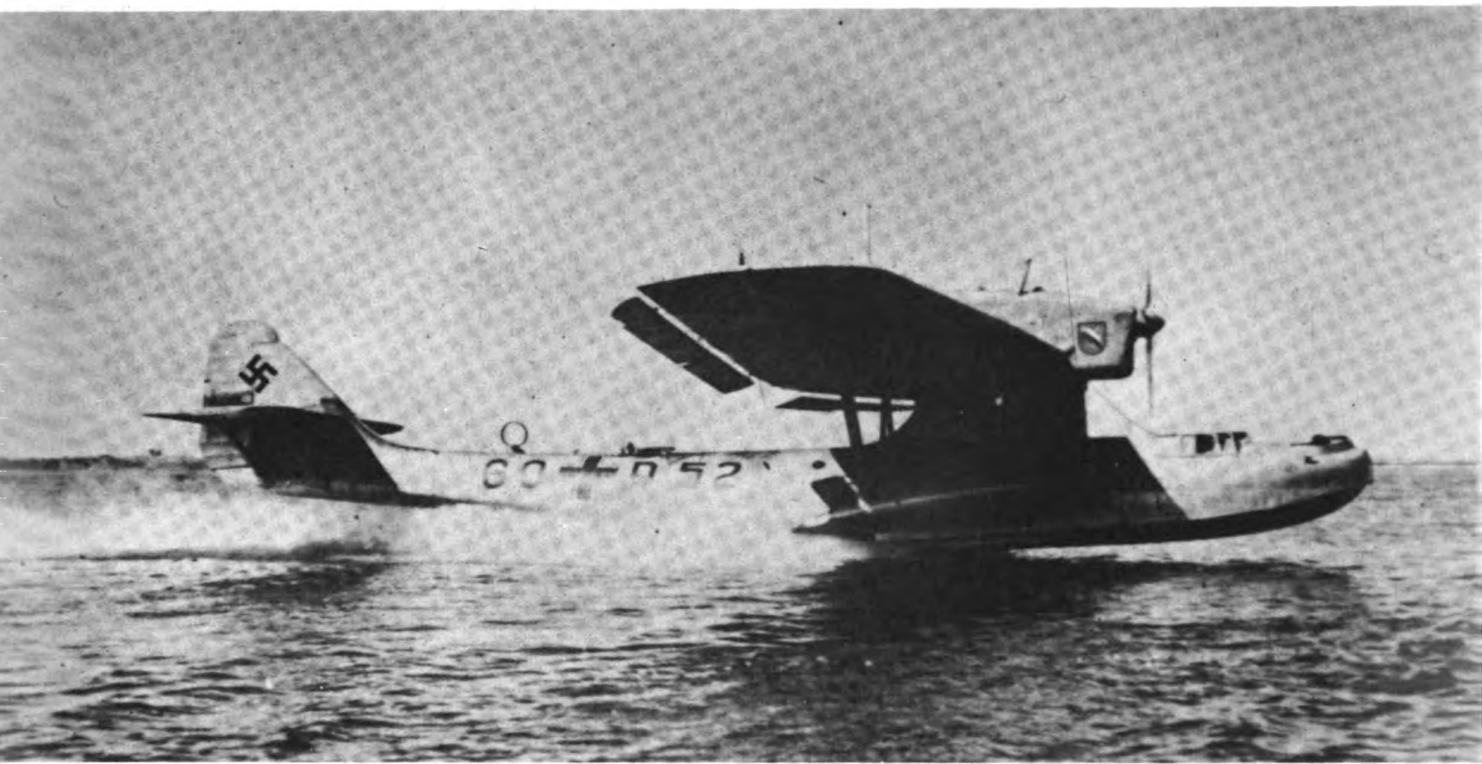
A DORNIER DO. 24 IN SERVICE WITH THE NETHERLAND AIRLINES

The Dornier Do. 24 transport, a tri-motor flying boat. Planes of this type were in use on the Netherland airlines. It has a two-step metal hull with stub wings and twin fins and rudders mounted high. The wing is mounted high above the hull by inverted "V" struts. It has a wing span of 88 feet, 7 inches, a length of 72 feet, 2

The Dornier Do. 18 flying boat was produced as a Trans-Atlantic mail carrier. The wings of this high-wing monoplane are mounted on a pylon high above the all-metal boat hull. They are of all-metal construction with fabric covering, except for the sections on either side of the engines which have a metal covering. The

inches, and a height of 17 feet, 11 inches. The empty weight is 7,011 pounds, and the gross weight is 29,700 pounds. The Do. 24 is powered by three B.M.W. radial air-cooled engines of 760 hp. each, giving it a top speed of 195 m.p.h. and a range of 2,050 miles

hull is constructed for catapulting and has stub-wing sponsons which are braced by struts to the main wing. The engines mounted in tandem are directly above the pylon on top of the wing. The Do. 18 is powered by two Junkers "Jumo" 205 liquid-cooled Diesel engines of 600 hp. each, giving it a speed of 162 m.p.h., a

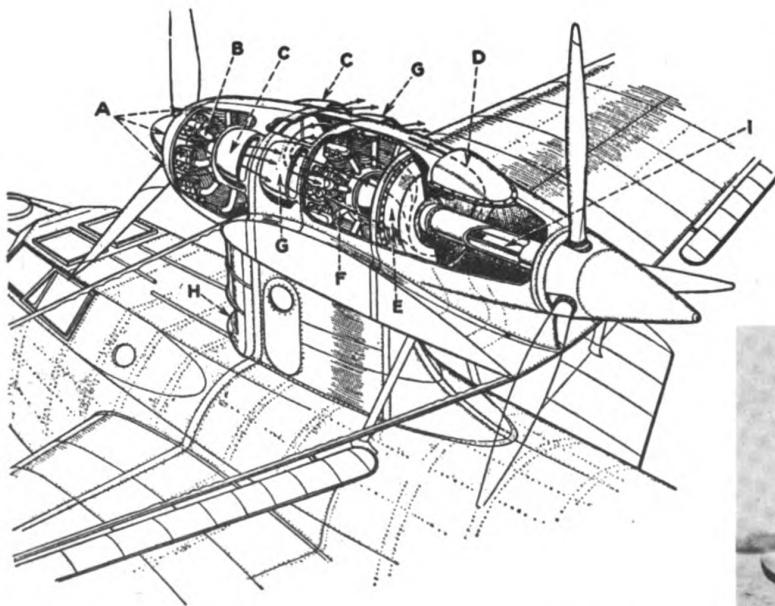


THE DORNIER DO. 18 TAKING OFF

range of 5,220 miles, and a service ceiling of 14,760 feet. This plane has a wing span of 77 feet, 9 inches, a length of 63 feet, 1

inch, and a height of 17 feet, 9 inches. The empty weight is 12,265 pounds, and the gross weight, 22,000 pounds.

*Later version of the Do. 18 is the Do. 18 K2. This is powered by two B.M.W. 132 radial engines of 830 hp. each. The method of using the air stream for cooling in this tandem installation is as follows: The air stream "A" enters the nacelle, then passes around the cylinders of the forward engine and leaves at the two outlets "C" on the rear engine, the air inlet is behind the motor at "D" and a cooler fan "E" forces the air through the rear engine "F" with out outlets at "G." Air inlet for the oil cooler is at "H" and "I" the drive shaft to the rear propeller.*



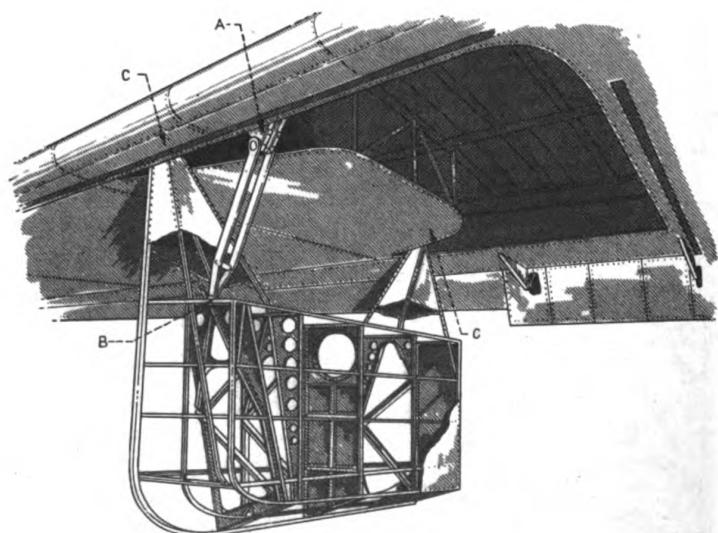
Dornier Do. 18 K2

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UNIVERSITY OF MICHIGAN

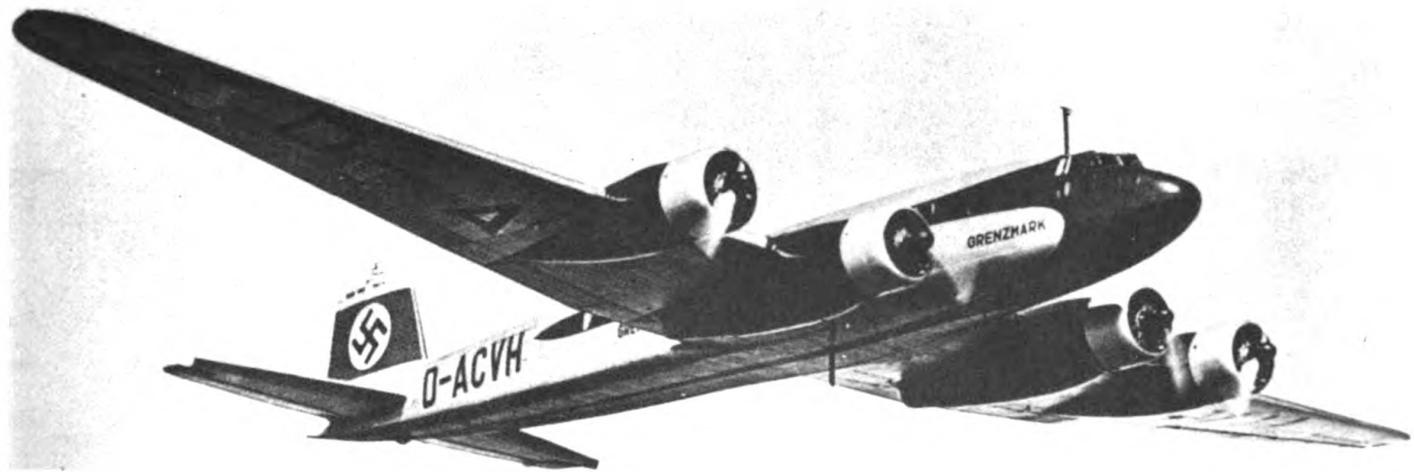


THE DORNIER DO. 26

The Dornier Do. 26 four engine flying boat originally planned for Trans-Atlantic mail service. This gull type high-wing monoplane of all-metal construction has a two-step boat-hull. Despite a loaded weight of over 22 tons, this plane is launched by catapults. Powered by four Junkers "Jumo" liquid-cooled Diesel engines which develop 2,400 hp. and are mounted in tandem pairs. Engines on trailing edge raises for take-off. It has a speed of 208 m.p.h. and a range of 5,600 miles. The wing span is 98 feet, 6 inches, and the length 80 feet, 6 inches.



*The Do-26 wing float retraction takes place by moving arm "A" which is hinged at "B" out toward the wing tip, while the float swings up being hinged at "C."*



THE FOCKE-WULF FW. 200 "CONDOR"

The Focke-Wulf Fw. 200 "Condor," a 26-passenger airliner which was in regular passenger service with the Deutsche Lufthansa. This all-metal low-wing monoplane flew non-stop from Berlin to New

York in the summer of 1939. The "Condor" is fitted with four engines, either B.M.W. of 830 hp. each or four Pratt & Whitney "Hornet" S I E 2-G engines. It has a maximum speed of 252 m.p.h., a cruising speed of 230 m.p.h., and a normal range of 932 miles. The service ceiling is 21,976 feet, empty weight 25,520 pounds, useful load 5,940 pounds, and gross weight 38,500 pounds. This airplane has a wing span of 107 feet, 9 inches, a length of 78 feet, 3 inches, and a height of 20 feet, 4 inches.



Interior showing seating arrangement of the "Condor"



THE HEINKEL HE.116 FREIGHT CARRIER

The Heinkel He. 116 is a four engine cargo transport with a wing span of 72 feet, 2 inches, an overall length of 44 feet, 11 inches and a height of 12 feet, 6 inches. The fuselage is constructed of metal and the wing is of wood structure with plywood covering. The radio operator and flight engineer are located in a compartment at the rear of the fuselage. This low-

wing transport is powered by four Hirth H M-508G engines of 270 hp. each, giving it a maximum speed of 232 m.p.h., a cruising speed of 198 m.p.h. with a service ceiling of 21,650 feet. It has a range of 2,795 miles. The weight empty is 9,592 pounds; it has a payload of 6,094 pounds and the gross weight is 15,685 pounds.



THE JUNKERS JU. 52/3 M AT A LLOYD AERO BOLIVIAN FIELD

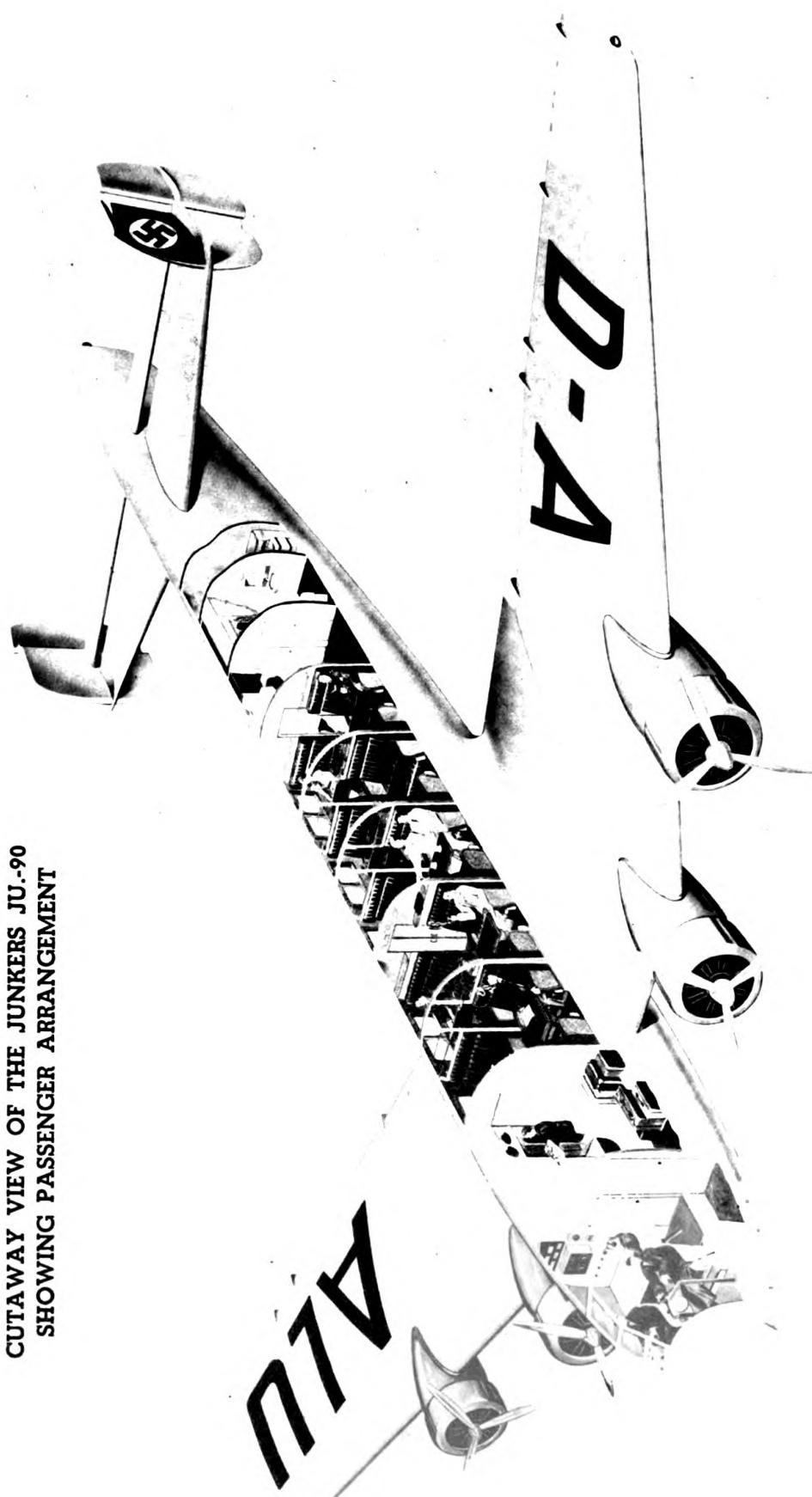
The Junkers Ju.52/3 M, a 14 to 17 passenger transport or cargo carrier, is one of the most familiar airliners to the European and South American air traveler. The Ju. 52 is a low-wing three engine plane of all-metal construction with corrugated metal covering. It is powered by three 760-hp. B.M.W. 132 L engines of 760 hp. each, or Pratt & Whitney "Wasp" S 3 H 16. It has

a wing span of 95 feet, 7 inches, a length of 62 feet, and a height of 14 feet, 10 inches. The empty weight is 15,400 pounds, useful load, 7,700 pounds, and gross weight, 53,200 pounds. This plane has a speed of 189 m.p.h., a cruising speed of 176 m.p.h., and a range of 1,000 miles.

PASSENGERS BOARDING THE JU. 52/3 M



CUTAWAY VIEW OF THE JUNKERS JU-90  
SHOWING PASSENGER ARRANGEMENT





THE JUNKERS JU 90 IN FLIGHT

The Junkers Ju. 90, a four engine all-metal passenger, or cargo transport. This long-range land plane is powered by four radial air-cooled Wright Cyclone GR 1820 G2 engines of 1,000 hp. each, giving it a top speed of 236 m.p.h., a cruising speed of 201 m.p.h., and a cruising range of 1,365 miles, with a service ceiling of 23,620 feet. The wing span of this low-wing monoplane is 114 feet, 10 inches, its length, 86 feet, 3

inches, and its height, 24 feet, 11 inches. The weight empty is 26,840 pounds, and the loaded weight is 44,000 pounds. The "Ju. 90" accommodates 40 passengers and a crew of four.



Interior view of the cargo version of the Giant Ju. 90.

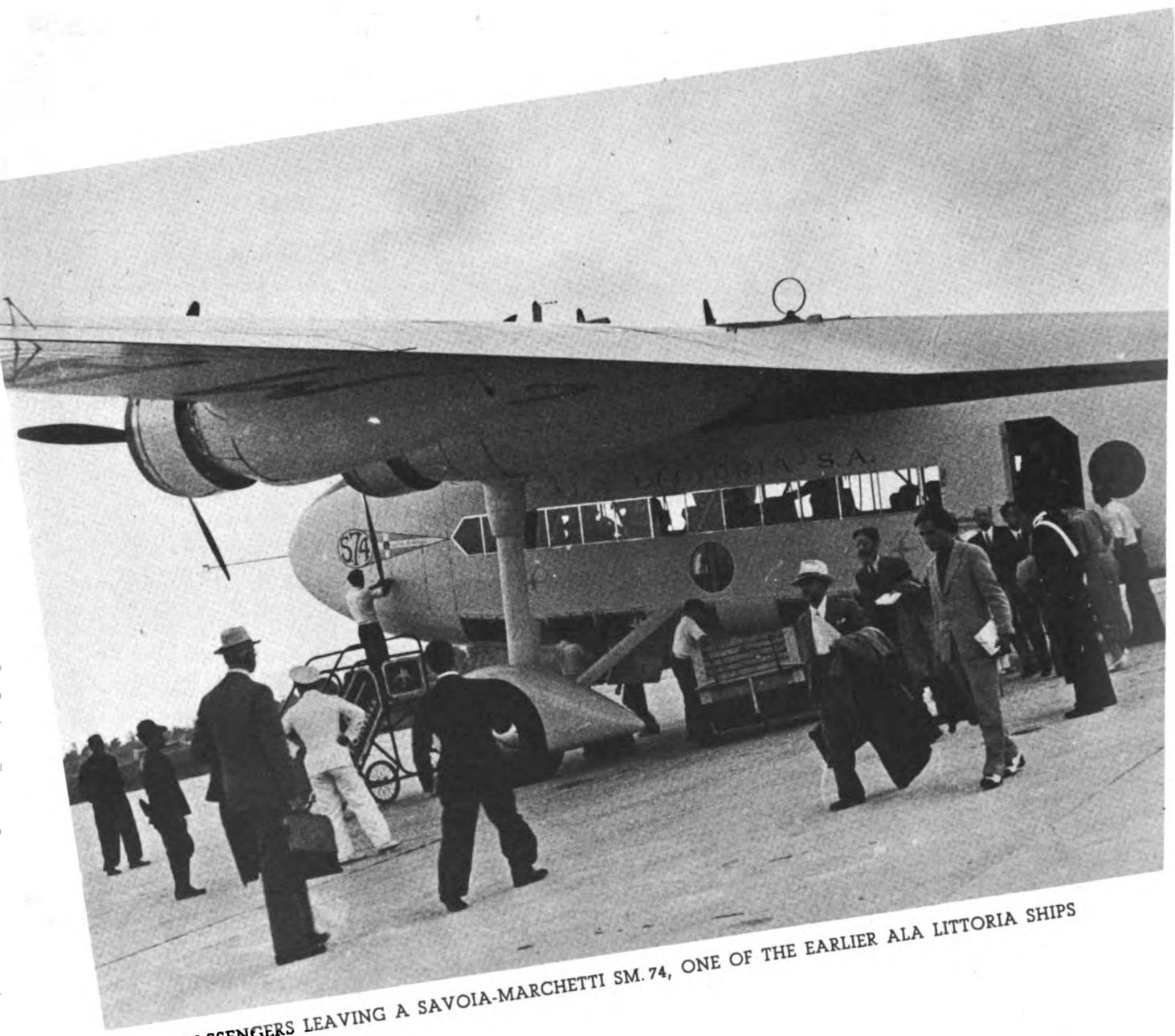


THE JUNKERS JU. 86 IN SERVICE WITH SWISSAIR LINES

The Junkers Ju. 86 twin engine 10 passenger transport carries a crew of two. This low-wing all-metal monoplane has a wing span of 73 feet, 10 inches, with a length of 57 feet, 10 inches, and a height of 15 feet, 5 inches. The "Ju. 86" is powered by two radial air-cooled B.M.W. 132 A engines of 845 hp. each, or two

Junkers "Jumo" 205 C Diesel engines of 600 hp. each. This transport has a top speed of 248 m.p.h., a cruising speed of 224 m.p.h. and a maximum range of 930 miles, with a service ceiling of 21,300 feet. The empty weight is 11,200 pounds, and the weight loaded is 17,600 pounds.

**ITALIAN  
TRANSPORT  
DESIGNS**



PASSENGERS LEAVING A SAVOIA-MARCHETTI SM.74, ONE OF THE EARLIER ALA LITTORIA SHIPS



THE CAPRONI CA. 133

The Caproni Ca. 133, a tri-motor sixteen passenger airliner. This high-wing monoplane is a steel tube structure covered partially with metal and also fabric. The landing gear is of the stationary type, and is mounted directly beneath the two

outer engines. It has a wing span of 69 feet, 8 inches, an overall length of 50 feet, 4 inches, and a height of 13 feet, 1 inch. The empty weight is 9,240 pounds, and the gross weight is 14,740 pounds.

The Cantieri Riuniti Dell' Adriatica. Cant. Z-506 flying boat accommodates 16 passengers. It is powered by three Alfa Romeo 126 RC 34 engines of 735 hp. each, giving it a top speed of 236 m.p.h. at 13,-

120 feet, with a maximum range of 807 miles. The wing span is 86 feet, 11 inches and the overall length is 63 feet, 4 inches. It has an empty weight of 15,840 pounds, and a loaded weight of 23,100 pounds.

THE CANT. Z-506 BEING SERVICED





THIS PIAGGIO P-108 NOW IN THE HANDS OF THE BRITISH  
IS A BOMBER VERSION OF THE PIAGGIO TRANSPORT

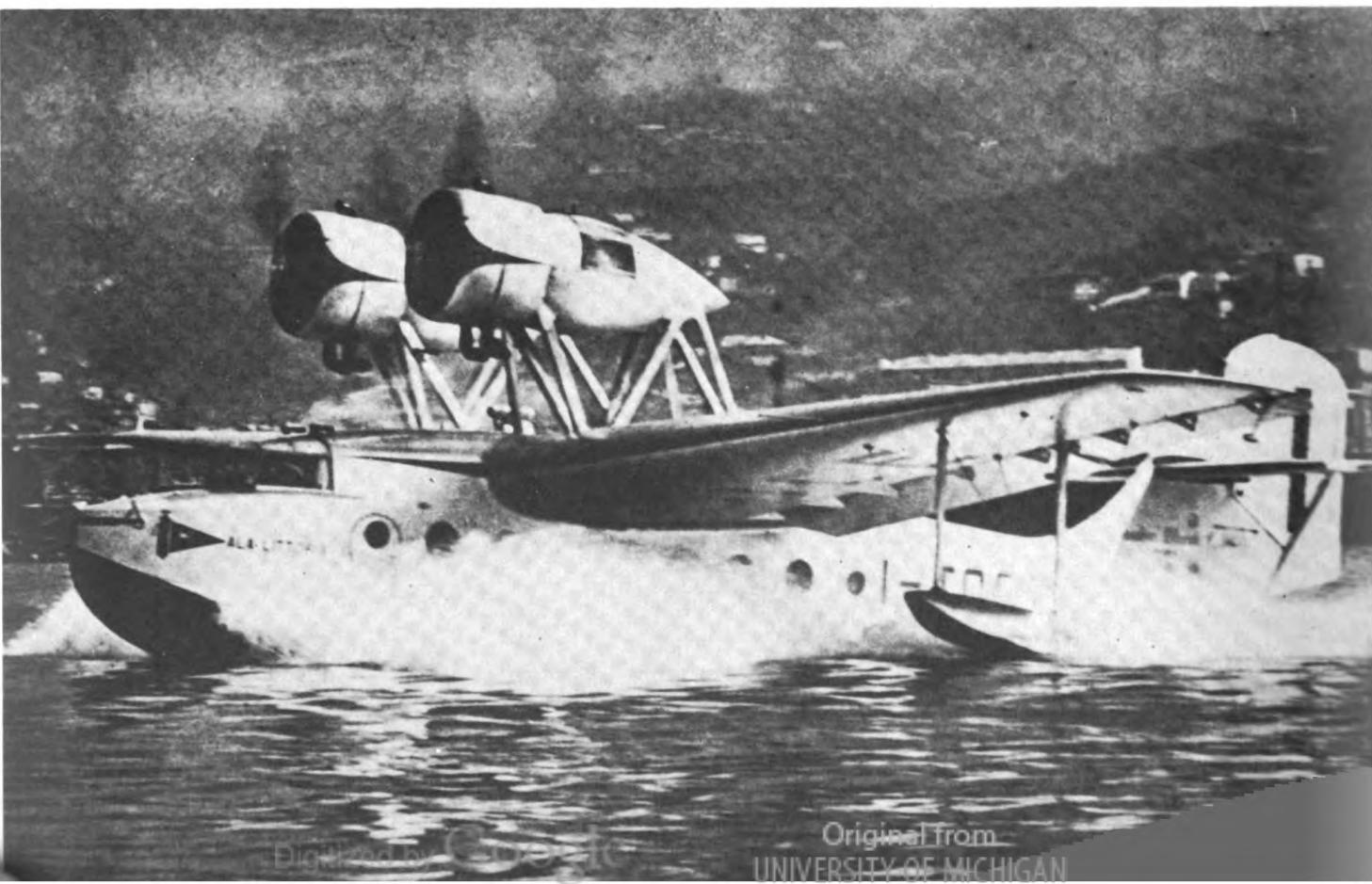
The Piaggio P-108C, Italy's first four engine stratoliner, is a low-wing monoplane with a wing span of 108 feet, 3 inches, a length of 81 feet, 6 inches, and a height of 19 feet, 2 inches. Powered by four Piaggio R12 R.C.35 air cooled radial engines

of 1,300 hp. each. It has a maximum speed of 290 m.p.h. at 11,480 feet, a cruising range of 2,500 miles and a service ceiling of 26,000 feet. Later versions of this ship were developed as a long range bomber.

The Macchi MC. 94, a twin-engine twelve passenger amphibian designed by Ing. Mario Castoldi, who designed the famous Macchi "Mc. 72," holder of the world's absolute speed record. The "MC. 94" is powered by two Wright "Cyclone" SGR-1820 F engines of 770 hp. each, giving it a top speed of 175 m.p.h., and a cruising

duration of approximately five hours, with a service ceiling of 19,024 feet. This high-wing monoplane has a wing span of 75 feet, 3 inches, a length of 53 feet, and a height, with wheels retracted, of 17 feet, 8 inches. The empty weight is 13,200 pounds, the useful load is 4,950 pounds, and the weight loaded is 18,150 pounds.

THE MACCHI MC. 94 TAKING OFF

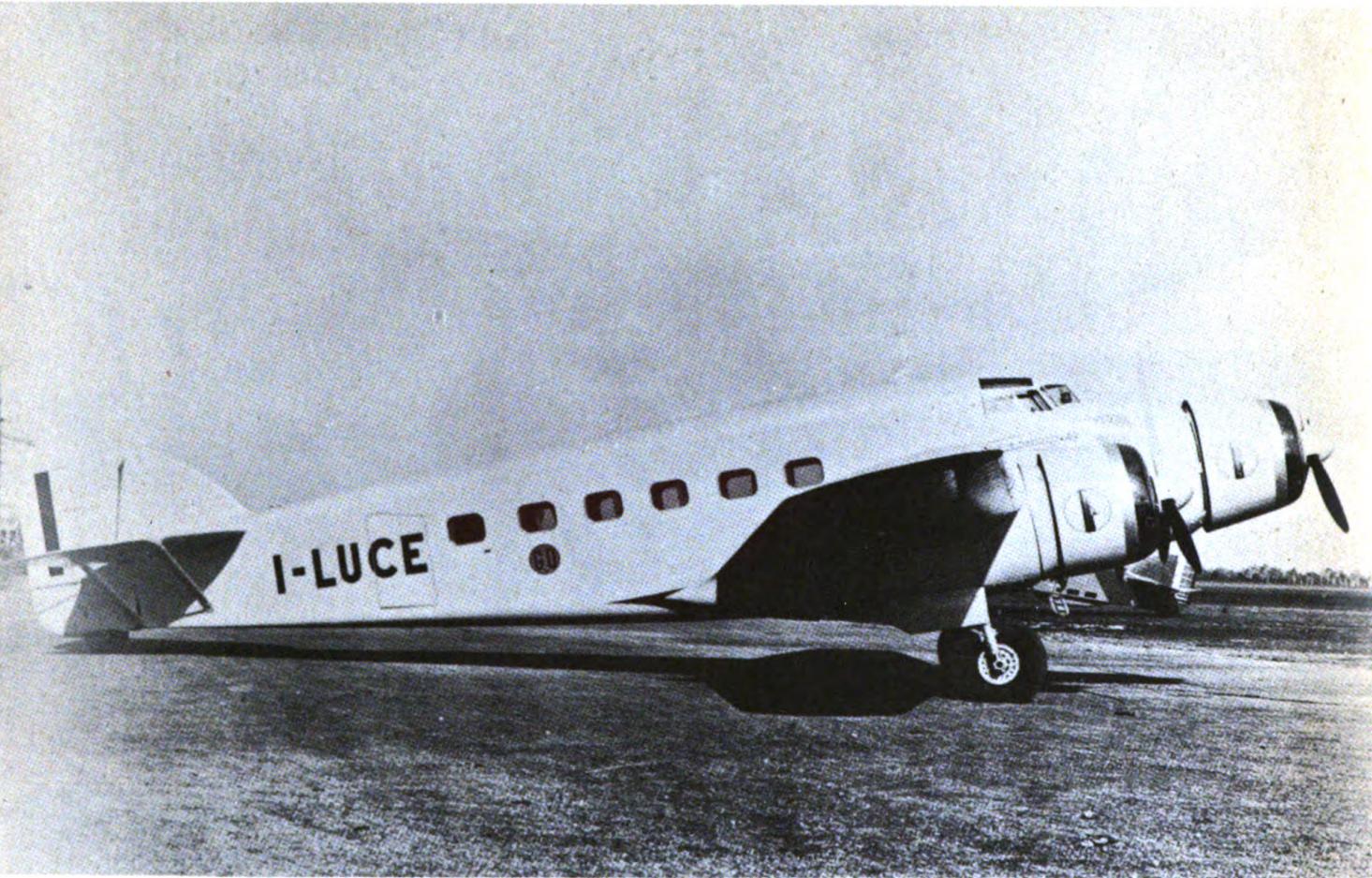




THE SAVOIA-MARCHETTI SM. 75

The Savoia-Marchetti SM. 75 was standard equipment on most of the regular routes of the Ala Littoria. This three-engine 24 passenger transport carries a crew of three. The fuselage is constructed of steel tube, the front of which is covered with metal, the sides and bottom with fabric, and the top with metal and plywood. This low-wing plane has a wing

span of 97 feet, 5 inches, a length of 73 feet, 1 inch, and a height of 17 feet, 4 inches. The empty weight is 20,900 pounds, and the loaded weight is 31,900 pounds. It is powered by three Alfa Romeo 126 RC 34 engines of 750 hp. each, giving it a top speed of 229 m.p.h. at 12,136 feet, a cruising speed of 201 m.p.h. at 14,760 feet, and a range of 930 miles.

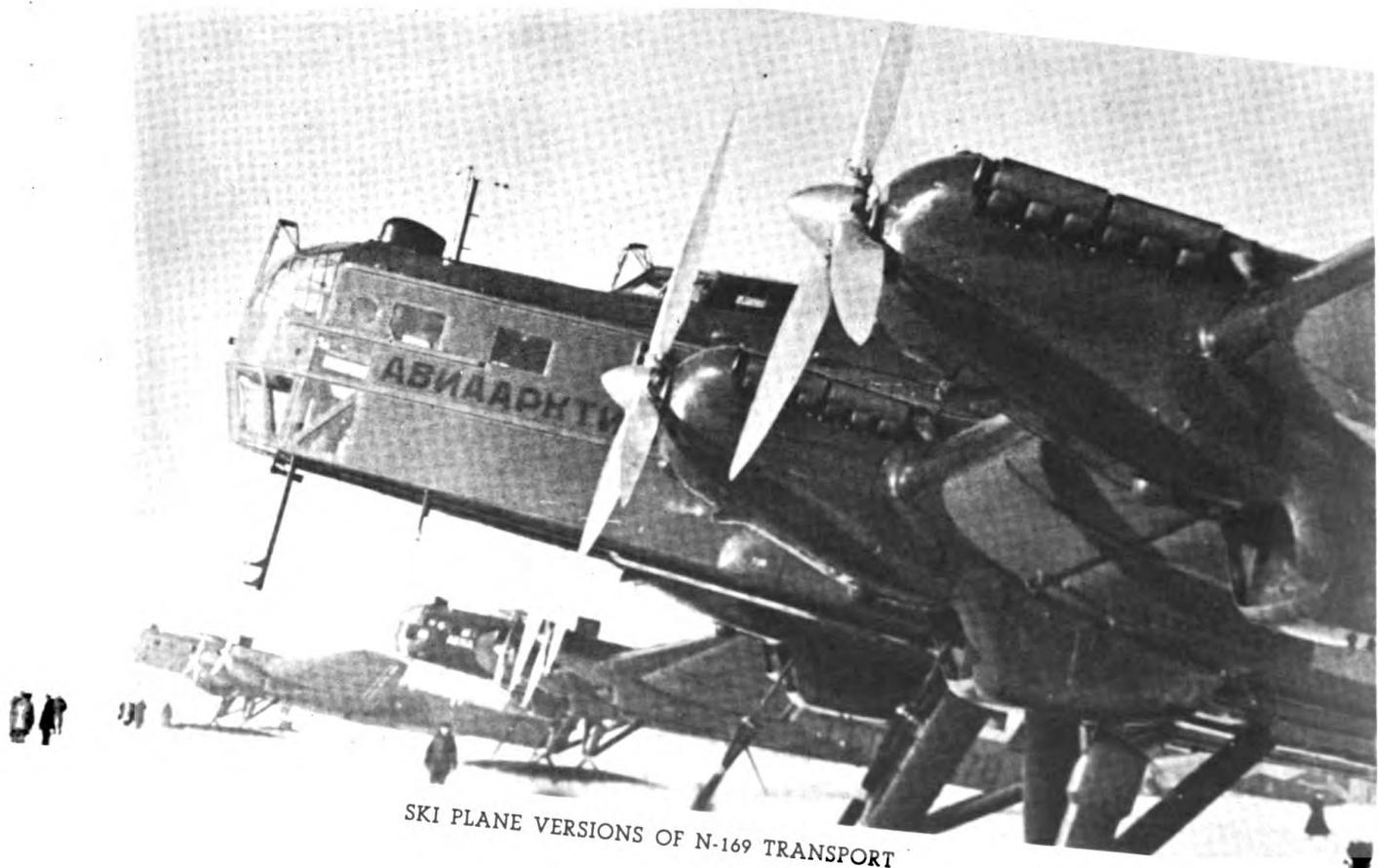


THE SAVOIA-MARCHETTI SM. 83

The Savoia-Marchetti SM. 83 is an exceptionally fast 10-passenger tri-motor airliner. Like other Savoia-Marchettis, this transport is of mixed construction: fabric, wood and metal. It has a wing span of 66 feet, 3 inches, a length of 53 feet, 2 inches, and height of 13 feet, 6 inches. The weight empty is 15,180 pounds, and the weight loaded 22,660 pounds. The "SM. 83" is

powered by three Alfa Romeo 126RC34 engines of 750 hp. each, giving it a top speed of 276 m.p.h. at 13,120 feet, a cruising speed of 248 m.p.h. at 16,400 feet, and a range of 930 miles. The Belgian Company Sabena used the "SM. 83" on its Trans-African route from Brussels to the Belgian Congo.

**RUSSIAN  
TRANSPORT  
DESIGNS**



SKI PLANE VERSIONS OF N-169 TRANSPORT



THE A.N.T. 25 GIANT SINGLE ENGINE TRANSPORT IN FLIGHT

The A.N.T. 25 is a ten passenger low-range transport designed by A. N. Tupolev. This low-wing monoplane was famous for the first Trans-polar flight from Moscow to the United States. The ship is of all-metal construction, the wings and tail group are corrugated aluminum covered with doped fabric to give it a smooth

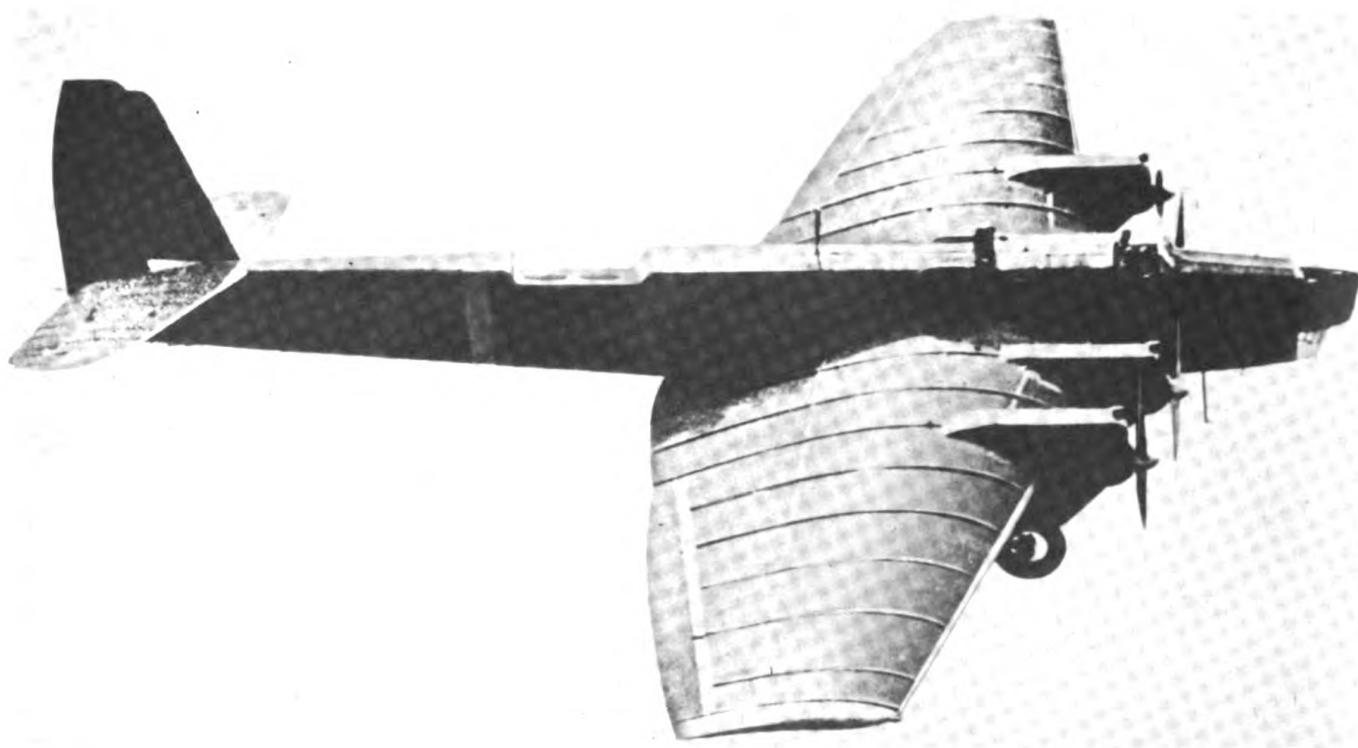
outer surface. The wing span of this single engine giant is 111 feet, 6 inches, the length is 43 feet, 11 inches and the height is 18 feet. It is powered by one M-34R engine of 1,000 hp., giving it a top speed of 149 m.p.h. with a range of over 6,260 miles. The empty weight is 9,240 pounds, and the gross weight is 24,750 pounds.

The A.N.T. 35, a ten passenger transport developed from Lockheed and Douglas types. This low-wing monoplane is of all-metal construction, with a wing span of 68 feet, 2 inches, and a length of 49 feet, 2 inches. Powered by two 850-hp. M-85

Gnome-Rhone 14 K frs. engines, giving it a top speed of 248 m.p.h., a cruising speed of 224 m.p.h. and a service ceiling of 27,880 feet. The total weight is 14,564 pounds.

THE A.N.T. 35 TRANSPORT





THE GIANT A.N.T. 6 IN FLIGHT

The A.N.T. 6 is a four engine transport derived from the Junkers design, and built in large numbers for Parachute troop transports. This type is of corrugated metal construction. It has unusual designed main landing gears with four wheels, one in front of the other on each

gear. The wing span of this low-wing monoplane is 138 feet, and the length 87 feet. The "A.N.T. 6" is powered by four M-34 Hispano-Suiza 12 Yers engines of 830 hp. each, giving it a speed of 124 m.p.h. and a maximum range of 800 miles. The gross weight is 33,000 pounds.



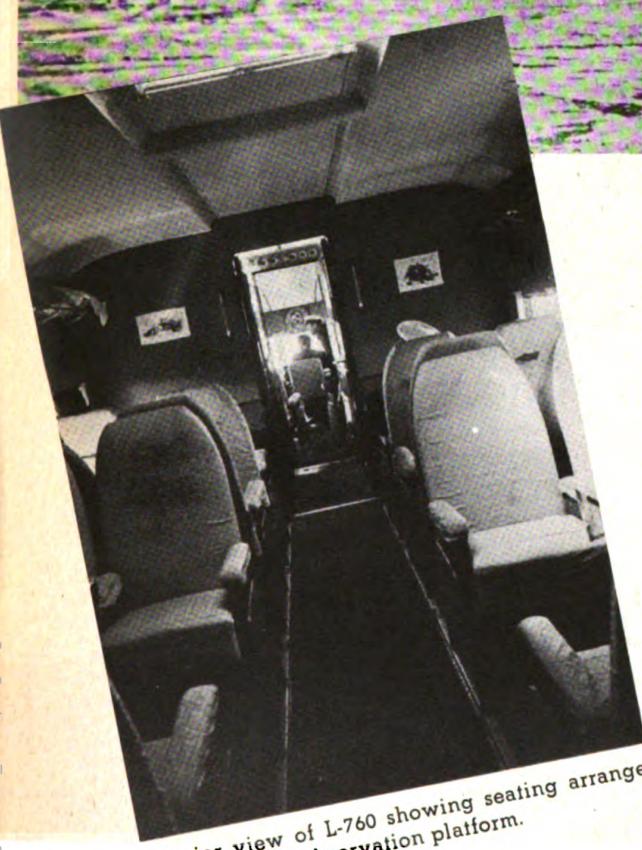
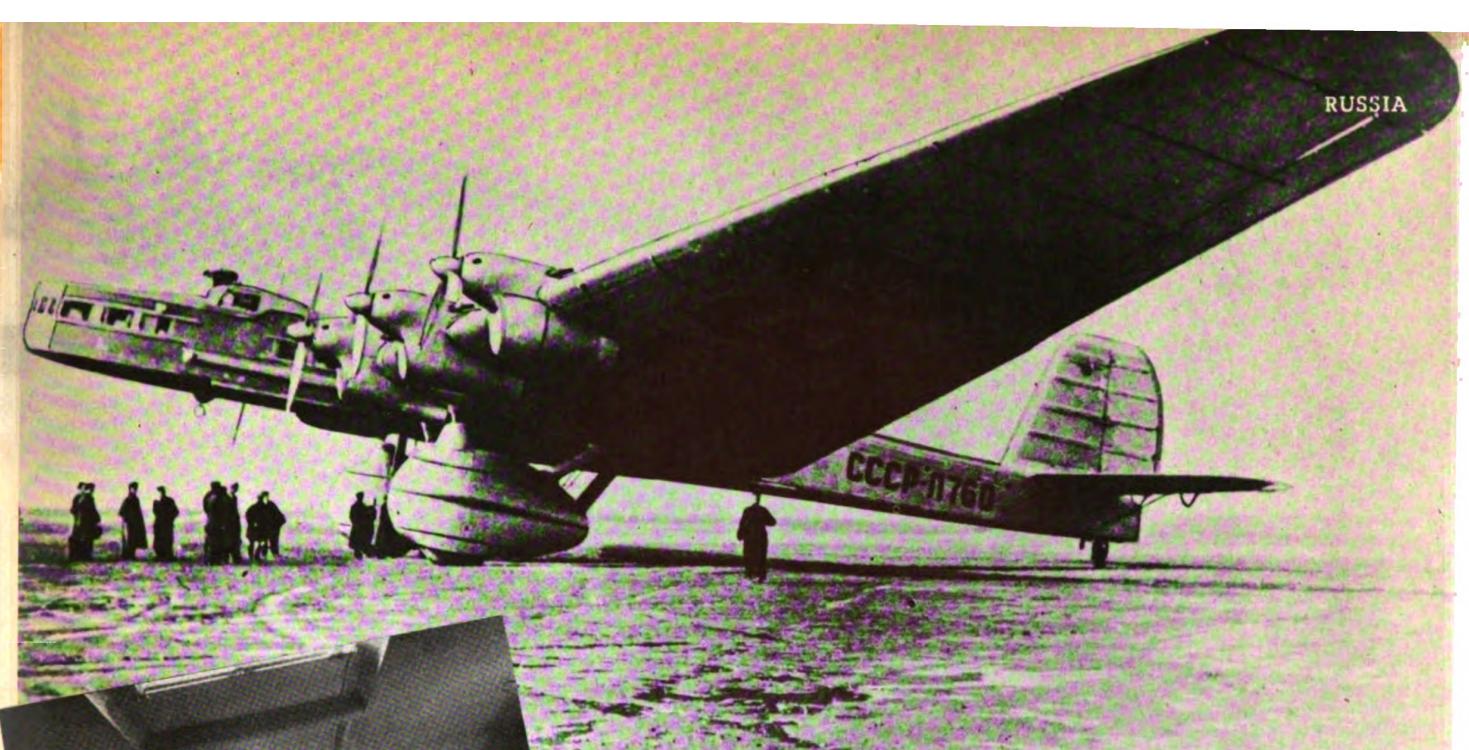
THE A. N. T. 41 TRANSPORT

The A.N.T. 41, a four engine transport of the same type used by Leanevsky in an attempt to fly from Moscow to the United States via the North Pole. This mid-wing monoplane is of all-metal construction with a wing span of approximately 118 feet. It has peculiar semi-retractable land-

ing gears with unusual wheel fairings. It is powered by four M-100 Hispano-Suiza Ycrs inline liquid cooled engines of 1,100 hp. each, giving it a top speed of 230 m.p.h., and a cruising range of 1,240 miles.

SKI PLANE VERSIONS OF N-169 TRANSPORT





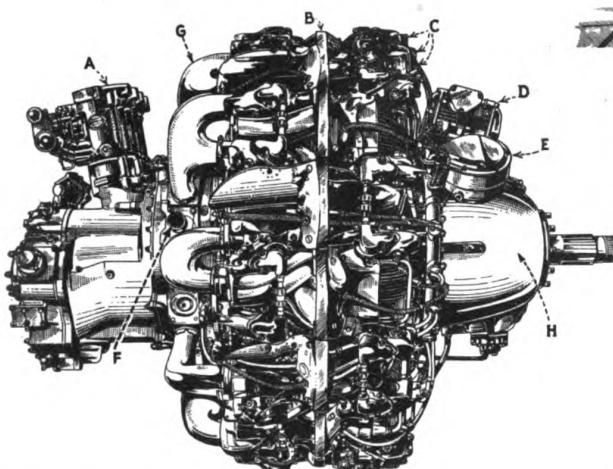
#### THE L-760 - THE WORLD'S LARGEST TRANSPORT

The L-760 is a six engine airliner, which just misses being as large as the world's largest land plane by two feet. (The Douglas B-19 has a wing span of 212 feet.) This mid-wing monoplane of all-metal construction is 112 feet in length and 25 feet in height. It accommodates 64 passengers and a crew of eight. The giant airliner is powered by six M-100 Hispano-Suiza 12 Yers engines, which gives it a total of 6,600 hp., a maximum speed of 186 m.p.h. and a cruising speed of 146 m.p.h. It has a service ceiling of 23,800 feet, and a range of 1,864 miles. The total weight, 103,000 pounds.

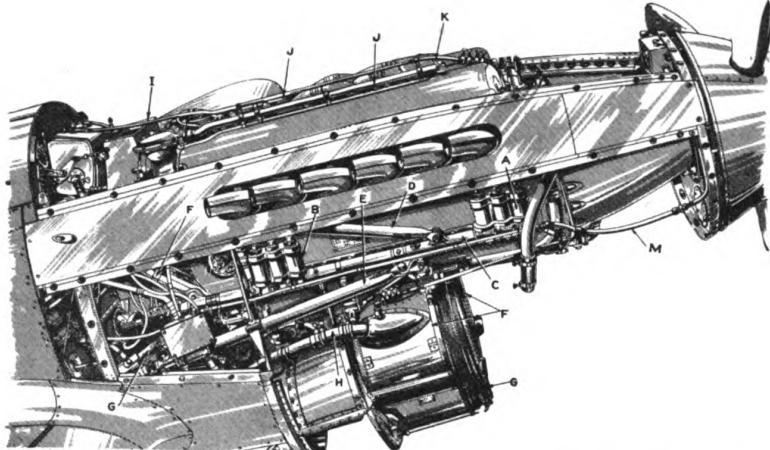
The Maxim Gorki 7 engine prototype of the L-760 met an untimely end during an air show, when a fighter plane dove into it.



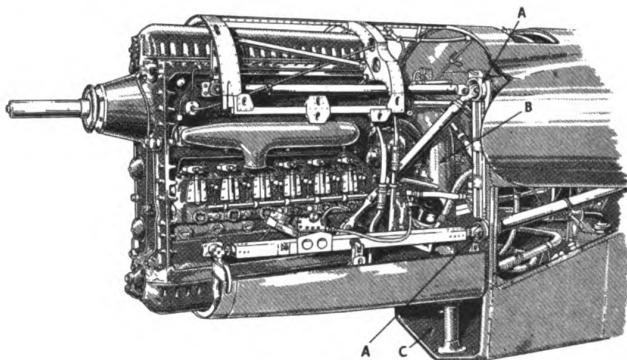
## POWER PLANTS



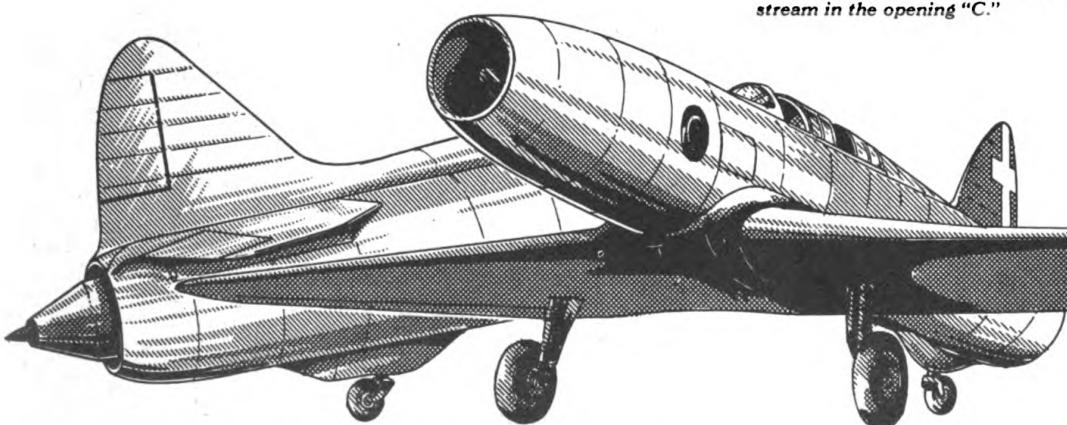
**The Pratt & Whitney Double Wasp R-2800 radial air-cooled engine.** "A" is the carburetor intake for the single stage supercharger. "B" are dural baffle plates which seal the area between the cylinders so that the air is forced into the fins of the rear bank of the cylinders. "C" are the cowl mounting lugs; "D" is the magneto, and "E" the distributor. "F" is an engine mounting bracket. The stainless steel intake pipes "G" are of fork construction and are made in halves, "H" is the reduction gear housing.



**The Allison inline liquid-cooled engine showing a typical installation.** It is supported by two separate mounts, one at "A" and one at "B," each being a group of three vibration dampening mounts. In turn these are attached to the horizontal strut of the engine mount "C." These are supported by "D" and "E" in the front and "F" and "G" in the rear. The liquid coolant radiators "F" and the oil radiator "G" can be seen below the mount. Intake pipe to the right coolant radiator is at "H." The carburetor air intake port is at "I" and the ignition harness for the cylinders is at "J." The pipe leading to the coolant expansion tank leads from the front of the engine at "K." The power cable for the electric propeller is at "M."



**The Junkers Jumo 205 Diesel engine (typical installation).** The entire power unit is built so that by removing a few connections and undoing four bolts of the engine mount, two of which are shown at "A," everything forward of the fire wall is removable and new unit can be installed in a very short time. Air is taken into the engine "B," the end of which projects into the air stream in the opening "C."



**Jet propulsion as a source of power is receiving much study and the adaptation of this type of power for transports is not far off.**

The principle of the "jet" plane shown, is that air enters the duct in the nose, an engine-driven blower produces a pressure which creates an air flow toward the rear end of the duct. The flow first cools the engine and the air is then heated and expanded so that it is driven through the jet at the end of the fuselage.

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